

Workshop Manual OCTAVIA II 2004 ➤

1.8/112; 118 kW TSI; 2.0/147 kW TSI engine

Engine ID	BZB	CDA A	CDA B	CCZ A					
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Edition 06.07

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List of Workshop Manual Repair Groups

Repair Group

- 00 - Technical data
- 01 - Self-diagnosis
- 10 - Removing and installing engine
- 13 - Crankgear
- 15 - Cylinder Head, Valve Gear
- 17 - Lubrication
- 19 - Cooling
- 20 - Fuel Supply
- 21 - Turbocharging
- 24 - Fuel Formation, Injection
- 26 - Exhaust System
- 28 - Ignition system

Technical information should always be available to the foremen and mechanics, because their careful and constant adherence to the instructions is essential to ensure vehicle road-worthiness and safety. In addition, the normal basic safety precautions for working on motor vehicles must, as a matter of course, be observed.

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Contents

00 - Technical data	1
1 Technical data	1
1.1 Engine number	1
1.2 Engine characteristics	1
01 - Self-diagnosis	3
1 Self diagnosis, safety measures, cleanliness regulations, directions	3
1.1 Self-diagnosis	3
1.2 Safety precautions when working on the fuel supply system	3
1.3 Release pressure in the high pressure area of the fuel system	4
1.4 Rules of cleanliness to observe when working on the fuel supply system	5
1.5 Safety measures to apply when working on the fuel injection and ignition system	6
1.6 General notes on the injection system	6
1.7 General notes on the ignition system	7
1.8 General instructions for charge air system	7
1.9 Additional instructions when undertaking assembly work on the air-conditioning system	8
10 - Removing and installing engine	10
1 Removing and installing engine	10
1.1 Removing engine	10
1.2 Securing the engine to the assembly stand	16
1.3 Installing the engine	17
2 Assembly bracket	21
2.1 Unit mounting - summary of components	21
2.2 Checking and adjusting the assembly bracket	22
13 - Crankgear	25
1 Cylinder block - Belt pulley side	25
1.1 V-ribbed belt drive - Summary of components	25
1.2 Removing and installing V-ribbed belt	26
1.3 Removing and installing tensioning device for V-ribbed belt	27
1.4 Removing and installing bracket for auxiliary units	29
1.5 Removing and installing vibration damper	30
2 Cylinder block - gearbox side	33
2.1 Summary of components	33
2.2 Removing and installing the two-mass flywheel	34
2.3 Removing and installing the sealing flange on the gearbox side	35
3 Crankshaft	38
3.1 Summary of components	38
3.2 Assign crankshaft bearing shells to the cylinder block	40
3.3 Pulling the needle bearing out of the crankshaft and driving it in	41
4 Pistons and conrods	43
4.1 Summary of components	43
4.2 Inspect piston, piston rings and cylinder bore	44
4.3 Separating new conrod	46
15 - Cylinder Head, Valve Gear	47
1 Covers for timing chains	47
1.1 Covers for timing chains - Summary of components	47
1.2 Removing and Installing top cover for timing chain	48
1.3 Removing and Installing bottom cover for timing chain	48
1.4 Replacing vibration damper gasket ring	53



2	Camshaft timing chain	54
2.1	Camshaft timing chain - Summary of components	54
2.2	Removing and installing camshaft timing chain	55
3	Balancing shaft timing chain and balancing shafts	59
3.1	Summary of components	59
3.2	Removing and installing balancing shaft timing chain	61
3.3	Removing and installing balancing shaft for inlet camshaft	63
3.4	Removing and installing balancing shaft for outlet camshaft	66
4	Cylinder head	69
4.1	Cylinder head - summary of components	69
4.2	Removing and installing cylinder head	71
4.3	Testing the compression	83
4.4	Testing the combustion chamber for tightness	84
4.5	Removing and installing the vacuum pump	84
5	Valve gear	86
5.1	Valve gear - Summary of components	86
5.2	Removing and installing camshafts	87
5.3	Checking the axial play of the camshafts	93
5.4	Replacing valve stem seals	94
5.5	Inspect valve guides	97
17 - Lubrication		98
1	Oil pan and oil pump	98
1.1	Oil pan and oil pump - Overview of the components	98
1.2	Removing and installing the lower part of the oil pan	99
1.3	Removing and installing oil pump	101
1.4	Removing and installing the upper part of the oil pan	102
2	Bracket for auxiliary units with oil filter and engine oil cooler	106
2.1	Bracket for auxiliary units with oil filter and engine oil cooler - Summary of components	106
2.2	Removing and installing engine oil cooler	107
2.3	Testing oil pressure and oil pressure switch	107
19 - Cooling		111
1	Cooling system	111
1.1	Parts of cooling system on the side next to the body - Summary of components	112
1.2	Connection diagram for coolant hoses	113
1.3	Draining and filling up coolant	114
2	Pumps, coolant regulators, coolant pipes	118
2.1	Coolant after-running pump V51 - Summary of components	118
2.2	Removing and installing coolant after-running pump V51	118
2.3	Coolant pipes - Summary of components	120
2.4	Removing and installing the front coolant pipes	120
2.5	Removing and installing the small coolant pipe	122
2.6	The coolant pump and coolant regulator - List of assembly parts	124
2.7	Replace coolant temperature sender G62	125
2.8	Removing and installing timing belt for coolant pump	126
2.9	Replacing radial sealing ring for coolant pump drive	128
2.10	Removing and installing coolant pump	129
2.11	Removing and installing coolant regulator	131
3	Radiator and radiator fan	135
3.1	Removing and installing fan shroud for radiator fan V7 and V35	135
3.2	Removing and installing radiator	136
3.3	Checking the coolant system for leaktightness	137
20 - Fuel Supply		140



1	Fuel tank and fuel delivery unit	140
1.1	Fuel tank for vehicles with front-wheel drive - Summary of components	140
1.2	Fuel tank for vehicles with four-wheel drive - Summary of components	142
1.3	Fuel filter - Summary of components	144
1.4	Extract fuel from the fuel tank	144
1.5	Removing and installing fuel tank for vehicles with front-wheel drive	146
1.6	Removing and installing fuel tank for vehicles with four-wheel drive	148
1.7	Removing and installing fuel delivery unit for vehicles with front-wheel drive	152
1.8	Removing and installing the fuel delivery unit for vehicles with four-wheel drive up to MY 2008	153
1.9	Removing and installing the fuel delivery unit for vehicles with four-wheel drive as of MY 2009	156
1.10	Removing and installing the sender for fuel gauge display G	159
1.11	Testing fuel pump	160
1.12	Removing and installing fuel gauge sender 2 G169 for vehicles with four-wheel drive	169
1.13	Removing and installing suction jet pump for vehicles with four-wheel drive	172
2	Electronic Engine Power Control (Electronic throttle)	173
2.1	Accelerator pedal module - Summary of components	173
2.2	Removing and installing accelerator pedal module	173
3	Activated charcoal container system	176
3.1	Activated charcoal container system - Summary of components	176
3.2	Checking the fuel tank venting	177
21	Turbocharging	178
1	Exhaust gas turbocharger	178
1.1	Exhaust turbocharger - Summary of components	178
1.2	Removing and installing exhaust gas turbocharger	182
1.3	Checking proper operation of pressure box for exhaust gas turbocharger	187
1.4	Removing and installing pressure box for exhaust turbocharger	189
1.5	Setting the pressure box for exhaust turbocharger (for engines with identification characters BZB, CDAA, CDAB)	190
2	Charge air system with exhaust gas turbocharger	194
2.1	Charge air cooling - Summary of components	194
2.2	Removing and installing charge air cooler	194
2.3	Overview plan for the exhaust turbocharging	196
2.4	Hose connections with push-fit couplings	196
2.5	Check charge air system with exhaust turbocharger for tightness	197
24	Fuel Formation, Injection	200
1	Fitting location of the injection system	200
2	Intake manifold and fuel distributor	203
2.1	Intake manifold - Summary of components	203
2.2	Fuel distributor - Summary of component	204
2.3	Removing and installing intake manifold with fuel distributor	205
2.4	Check fuel pressure sender G247	211
2.5	Removing and installing fuel pressure sender G247	213
2.6	Removing and installing the throttle valve control unit J338	215
2.7	Clean throttle valve control unit J338	216
3	Air filter	217
3.1	Air filter - Summary of components	217
3.2	Removing and installing air filter housing	218
4	High pressure pump	219
4.1	High pressure pump - Summary of components	219
4.2	Removing and installing the high pressure pump	220
5	Injection valves	222



5.1	Removing and installing injection valves	222
6	Testing components	227
6.1	Test intake manifold changeover	227
6.2	Check double non-return valve	228
7	Engine control unit	230
7.1	Removing and installing engine control unit	230
26 - Exhaust System		232
1	Removing and installing parts of the exhaust system	232
1.1	Exhaust system - Summary of components for engine identification characters BZB	232
1.2	Exhaust system - Summary of components for vehicles with engine identification characters CDAA, CDAB, CCZA and front-wheel drive	234
1.3	Exhaust system - Summary of components for vehicles with engine identification characters CDAA, CDAB and four-wheel-drive	236
1.4	Removing and installing exhaust pipe	237
1.5	Replacing middle or rear part of the exhaust system	238
1.6	Aligning exhaust system free of stress	239
1.7	Inspecting the exhaust system for leaktightness	240
28 - Ignition system		241
1	Ignition system	241
1.1	Summary of components	241
1.2	Removing and installing ignition coils with power output stages	241





00 – Technical data

1 Technical data

1.1 Engine number

The engine identification characters and the engine number are located to the left on the joint separating the engine/gearbox.

The engine number consists of up to nine digits (alphanumeric). The first part represents the "engine code" (maximum 3 identification letters), the second (the six part section) the "serial number". If more than 999.999 engines with the same engine code were produced then the first digit of the six part section will be replaced by a letter.

In addition, a sticker with the "engine identification character" and "serial number" is affixed to the top cover for timing chain.

The engine identification character is also indicated on the vehicle data sticker.

1.2 Engine characteristics

Identification characters	BZB	CDA A	CDAB	CCZA
Manufactured	06.07 ? 10.08	11.08 ?	03.09 ?	11.08 ?
Emission levels in accordance with	EU-4	EU-2 DDK, EU-4 ¹⁾ , EU-5	EU-4 ¹⁾ , EU-5	EU-4 ¹⁾ , EU-5
Displacement cm ³	1798	1798	1798	1984
Power output kW at rpm	118/5000	118/5000	112/6000	147/5100
Torque Nm at rpm	250/1500	250/1500	250/1500	280/1700
Bore Ø mm	82,5	82,5	82,5	82,5
Stroke mm	84,2	84,2	84,2	92,8
Compression	9,6:1	9,6:1	9,6:1	9,6:1
Cylinder / valves per cylinder	4/4	4/4	4/4	4/4
RON	unleaded 95 ²⁾	unleaded 95 ²⁾	unleaded 95 ²⁾	unleaded 95 ²⁾
Ignition system, fuel injection	Motronic MED 17.5	Motronic MED 17.5	Motronic MED 17.5	Motronic MED 17.5
Type of fuel preparation	Direct injection homogeneous	Direct injection homogeneous	Direct injection homogeneous	Direct injection homogeneous
Knock control	1 sensor	1 sensor	1 sensor	1 sensor
Lambda control	1 Lambda probe	2 Lambda probes	2 Lambda probes	2 Lambda probes
Three-way catalytic converter	yes	yes	yes	yes
Exhaust gas recirculation	no	no	no	no
Intake manifold change-over	yes	yes	yes	yes
Camshaft adjustment	yes	yes	yes	yes
Balancing shafts	yes	yes	yes	yes
Secondary air system	no	no	no	no
Exhaust gas turbocharger	yes	yes	yes	yes

¹⁾ according to EU-5

²⁾ At least 91 RON in exceptional cases, although engine output is reduced



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01 – Self-diagnosis

1 Self diagnosis, safety measures, cleanliness regulations, directions

1.1 Self-diagnosis

This Rep.-Gr. is deleted.

For this use the “Vehicle self-diagnosis”, “Measuring method” and “Fault finding” ⇒ Vehicle diagnosis, testing and information system VAS 5051.

1.2 Safety precautions when working on the fuel supply system



WARNING

- ◆ *The safety measures for the pressure reduction in the high pressure area of the fuel system must be observed ⇒ [page 4](#).*
- ◆ *The fuel feed line is pressurized! Wear safety goggles and safety clothing, in order to avoid injuries and skin contact with fuel. Place a clean cleaning cloth around the connection point before detaching wiring. Reduce pressure by carefully removing the wiring.*

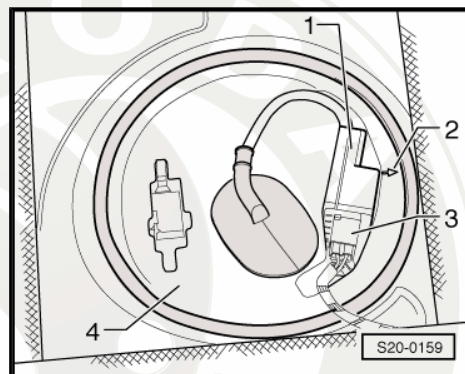
- ◆ The fuel pump is activated when the ignition is switched on and by the door contact switch of the driver door. Before opening the fuel system and for reasons of safety, if the battery is not disconnected, the plug -3- must be disconnected from the fuel pump control unit.



Caution

When undertaking all installation work, particularly in the engine compartment because of its cramped construction, please observe the following:

- ◆ *Lay lines of all kinds (e.g. for fuel, hydraulic fluid, the active charcoal container-unit, cooling fluid and refrigerant, brake fluid, vacuum) and electrical lines in such a way that the original line guide is re-established.*
- ◆ *In order to avoid damage to the cables, ensure that there is adequate free access to all moving or hot components.*



When removing and installing the fuel gauge sender or the fuel delivery unit from a full or partly filled fuel tank, pay attention to the following points:

- ◆ The extraction hose of an exhaust extraction system which is switched on, must be positioned close to the assembly opening of the fuel tank in order to extract the released fuel vapours, even before the work is commenced. If no exhaust extraction system is available, a radial fan (motor not in air flow of fan) with a delivery volume of more than 15 m³/h must be used.
- ◆ Avoid skin contact with fuel!
- ◆ Wear fuel-resistant gloves!

1.3 Release pressure in the high pressure area of the fuel system



WARNING

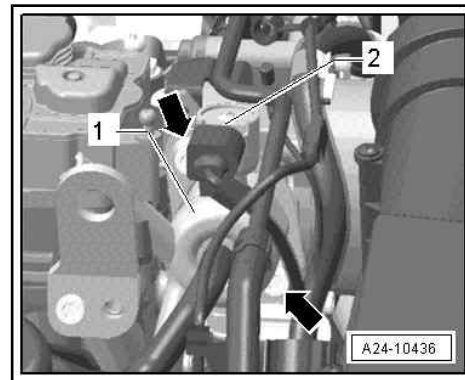
- ◆ *The injection system consists of a high pressure part (maximum 15 MPa = 150 bar) and a low pressure part (approx. 0.6 MPa = 6 bar).*
- ◆ *Before opening the high pressure area, e.g. removing the high pressure pump, the fuel distributor, the injection valves, the fuel pipes or the fuel pressure sender -G247-, the fuel pressure in the high pressure area with a remaining pressure of approx. 0.6 MPa (6 bar) must be reduced. The procedure for this is described below.*



- Disconnect the plug from the fuel pressure regulating valve - N276- -2- at the high pressure pump.
- Let the engine run at idling speed for approx. 10 seconds.

**Note**

- ◆ *If the plug is disconnected from the fuel pressure regulating valve -N276- at idling speed, the pressure in the high pressure part is reduced to approx. 0.6 MPa (6 bar).*
- ◆ *After the high pressure is reduced, the high pressure system must be opened, because the fuel pressure increases again through the heat.*

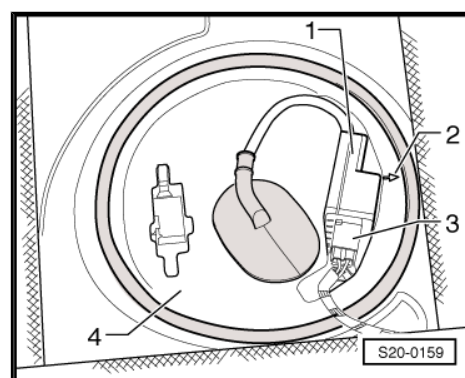


- Switch off ignition.
- For safety reasons before opening the fuel system disconnect the plug from the fuel pump control unit -3-.

**WARNING**

The fuel lines are pressurized! Wear safety goggles and safety clothing, in order to avoid injuries and skin contact with fuel. Before opening the high pressure system lay cleaning cloths around the connection point.

- Now lay a clean cleaning cloth around the connection point and carefully open it up, in order to reduce the remaining pressure of approx 0.6 MPa (6 bar). Collect the fuel which flows out.

**Note**

- ◆ *Interrogate the fault memory of the engine control unit at the end of the following work and delete all the fault entries.*
- ◆ *If the fault memory was erased, the readiness code must be generated ⇒ Vehicle diagnosis, testing and information system VAS 5051.*

1.4 Rules of cleanliness to observe when working on the fuel supply system

Carefully observe the following five rules for cleanliness when working on the fuel supply/injection system:

- ◆ Thoroughly clean the connection points and their surroundings before releasing.
- ◆ Place removed parts on a clean surface and cover. Do not use fuzzy cloths!
- ◆ Carefully cover or close opened components if the repair is not completed immediately.
- ◆ Only install clean parts: Remove spare parts from their wrapping immediately before installing. Do not use any parts which have been stored unwrapped (e.g. in tool boxes).
- ◆ When the system is opened: Avoid using compressed air. Avoid moving the vehicle.

1.5 Safety measures to apply when working on the fuel injection and ignition system



WARNING

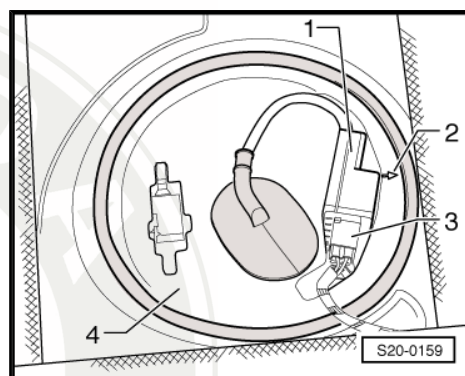
- ◆ *The safety measures for the pressure reduction in the high pressure area of the fuel system must be observed ⇒ [page 4](#) .*
- ◆ *The fuel line is under pressure! Wear safety goggles and safety clothing, in order to avoid injuries and skin contact with fuel. Place a clean cleaning cloth around the connection point before detaching wiring. Reduce pressure by carefully removing the wiring.*

Observe the following points to prevent injury to persons and/or damage to the injection and ignition system:

- ◆ Do not touch or remove ignition leads and ignition coils with power output stages with the engine running or at start speed.
- ◆ Ignition must be switched off before disconnecting and re-connecting the cables of the fuel injection and the ignition system as well as of the test equipment.
- ◆ If the engine must be operated at start speed without the engine starting, as for example, when checking the compression pressure, open lid of fuse carrier in the engine compartment and unplug fuse for Motronic current supply relay -J271- ⇒ Current flow diagrams and Fitting locations.
- ◆ The fuel pump is activated when the ignition is switched on and by the door contact switch of the driver door. Before opening the fuel system and for reasons of safety, if the battery is not disconnected, the plug -3- must be disconnected from the fuel pump control unit.

If test and measuring devices are required during test drives observe the following:

- ◆ Always secure the test and measuring devices on the rear seat and have a second person operate them there.
- ◆ If the test and measuring devices are operated from the passenger seat, the passenger could be injured by the release of the passenger airbag in the event of an accident.



1.6 General notes on the injection system

Repairing valve gear ⇒ [page 241](#) .

- ◆ The engine control unit is equipped with self-diagnosis. Before repairs and also for fault finding, first of all interrogate the fault memory. Also check the vacuum hoses and connections (unmetered air).
- ◆ Fuel hoses in the engine compartment must only be secured with spring-type clips ⇒ electronic catalogue of original parts . The use of clamp-type or screw-type clips is not allowed.
- ◆ A minimum voltage of 11.5 V is required for perfect functioning of the electrical components.
- ◆ Do not use sealants containing silicone. Traces of silicone elements drawn in by the engine are not burnt in the engine and damage the lambda probe.
- ◆ If after fault finding, repair or inspection of components the engine starts briefly and then stops, it is possible that the immobiliser blocks the engine control unit. Then if necessary the



control unit must be adapted ⇒ Vehicle diagnosis, testing and information system VAS 5051.

- ◆ When opening the driver door the fuel pump is activated for 2 seconds in order to build up the pressure in the fuel system.
- ◆ Certain inspections may cause the control unit to detect and store a fault. It is therefore necessary to interrogate the fault memory after having completed all inspections and repairs, and if necessary delete ⇒ Vehicle diagnosis, testing and information system VAS 5051.

Safety measures ⇒ [page 6](#).

1.7 General notes on the ignition system

- ◆ The ignition must always be switched off before disconnecting and re-connecting the battery, otherwise the engine control unit may be damaged.
- ◆ The engine control unit is equipped with self-diagnosis; inspect ⇒ Vehicle diagnosis, testing and information system VAS 5051.
- ◆ A minimum voltage of 11.5 V is required for perfect functioning of the electrical components.
- ◆ Certain inspections may cause the control unit to detect and store a fault. It is therefore necessary to interrogate the fault memory after having completed all inspections and repairs, and if necessary delete ⇒ Vehicle diagnosis, testing and information system VAS 5051.
- ◆ If after fault finding, repair or inspection of components the engine starts briefly and then stops, it is possible that the immobiliser blocks the engine control unit. Then if necessary the control unit must be adapted ⇒ Vehicle diagnosis, testing and information system VAS 5051.

Safety measures ⇒ [page 6](#).

Setting data, spark plugs ⇒ Maintenance ; Octavia II.

1.8 General instructions for charge air system

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WARNING

When undertaking all installation work, particularly in the engine compartment because of its cramped construction, please observe the following:

- ◆ *Lay lines of all kinds (e.g. for fuel, hydraulic fluid, cooling fluid and refrigerant, brake fluid, vacuum) and electrical lines in such a way that the original line guide is re-established.*
- ◆ *Ensure that there is adequate free access to all moving or hot components.*

**Caution**

In case a mechanical damage to the exhaust gas turbocharger is found, e.g. damage to the compressor wheel, it is not sufficient to only replace the turbocharger. In order to avoid consequential damage, perform the following tasks:

- ◆ *Clean all oil lines.*
- ◆ *Change engine oil and oil filter.*
- ◆ *Inspect the air filter housing, the air filter element and the intake hoses for contaminations.*
- ◆ *Inspect the whole charge-air routing and the charge air cooler for foreign bodies.*

If foreign bodies are detected in the charge air system, the complete charge-air routing must be cleaned and if necessary the charge air cooler must also be replaced.

- ◆ The charge-air system must be tight.
- ◆ Always replace self-locking nuts.
- ◆ Hose connections and hoses of the charge air system must be free of oil and grease before being installed. The gasket ring and the sealing surface must be slightly oiled only for push-fit couplings ⇒ [page 196](#) .
- ◆ Assembly of hose connections with push-fit couplings ⇒ [page 196](#) .
- ◆ Only install approved clamps for securing the hose connections ⇒ Electronic Catalogue of Original Parts .
- ◆ Use pliers for spring strap clamps to fit the spring strap clips.
- ◆ Before screwing on the oil feed line, fill the exhaust gas turbocharger on the connection fitting with engine oil.
- ◆ After installing the turbocharger, run engine at idling speed for about 1 minute to ensure that oil is supplied to the turbocharger.

1.9 Additional instructions when undertaking assembly work on the air-conditioning system

**WARNING**

Do not open the refrigerant circuit of the air conditioning system.

**Note**

In order to avoid damage to the condenser as well as to the refrigerant lines and hoses, ensure that the lines and hoses are not over-tensioned, kinked or bent.

Steps which should be taken in order to remove and install the engine without opening the refrigerant circuit.

- Remove the holding clamp(s) of the coolant lines.
- Remove AC compressor from the bracket ⇒ [page 25](#) .



- Mount the AC compressor in such a way that the refrigerant lines/hoses are not under tension.



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10 – Removing and installing engine

1 Removing and installing engine

1.1 Removing engine

Special tools and workshop equipment required

- ◆ Engine/gearbox jack , e.g. -V.A.G 1383 A-
- ◆ Double ladder , e. g. -VAS 5085-
- ◆ Engine mount -T10359-
- ◆ Removal tool for inner lining of the door panel -MP8-602/1 -
- ◆ Pliers for spring strap clamps
- ◆ Catch pan e.g. -VAS 6208 -
- ◆ Grease -G 000 100-
- ◆ Cable strap



Note

- ◆ *The engine is removed downwards together with the gearbox.*
- ◆ *All cable straps that have been loosened or cut open when the engine was removed must be fitted again in the same location when the engine is installed again.*
- ◆ *Collect drained coolant in a clean container for reuse or proper disposal.*



Caution

When undertaking all installation work, particularly in the engine compartment because of its cramped construction, please observe the following:

- ◆ ***Lay lines of all kinds (e.g. for fuel, hydraulic fluid, the active charcoal container-unit, cooling fluid and refrigerant, brake fluid, vacuum) and electrical lines in such a way that the original line guide is re-established.***
- ◆ ***In order to avoid damage to the cables, ensure that there is adequate free access to all moving or hot components.***

Observe all safety measures and notes for assembly work on the fuel, injection and ignition system and the charge air system as well as rules for cleanliness ⇒ [page 3](#) .

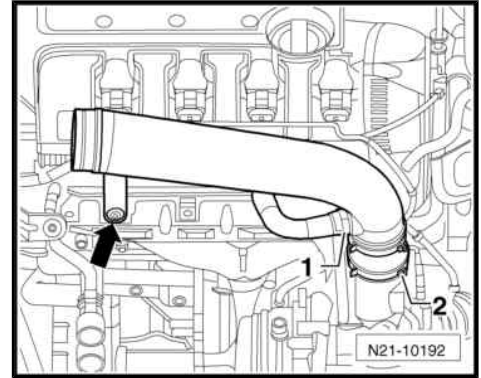
- Remove the air filter housing ⇒ [page 218](#) .

- Pull off ventilation tube -1- for crankcase ventilation.
- Release screw -arrow-.
- Remove intake manifold, to do slacken hose clamp -2-.

Note

Seal inlet connection at turbocharger.

- Before disconnecting the battery, if necessary remove the adapter for the anti-theft wheel bolts from the luggage compartment.
- Remove battery and battery tray ⇒ Electrical System; Rep. Gr. 27 .
- Remove the front right wheelhouse liner ⇒ Body Work; Rep. Gr. 66 .

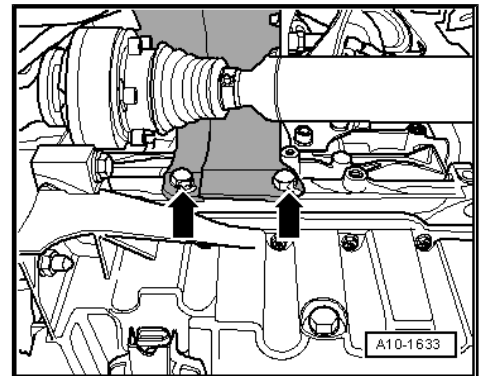


Vehicles with front-wheel-drive

- Unbolt heat shield for right drive shaft -arrows-.

Continued for all vehicles

- Remove right drive shaft ⇒ Chassis; Rep. Gr. 40 .
- Unscrew the left drive shaft from the flange shaft of the gearbox and tie up as much as possible.
- Remove pre-exhaust pipe ⇒ [page 237](#) .

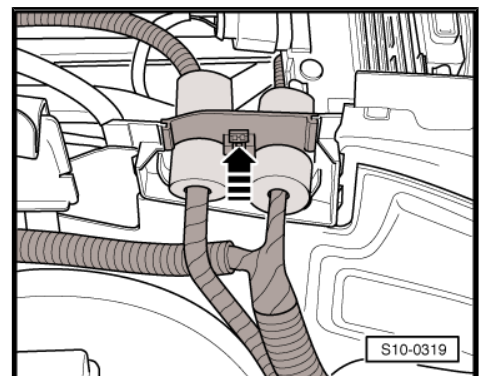


Vehicles with four-wheel drive

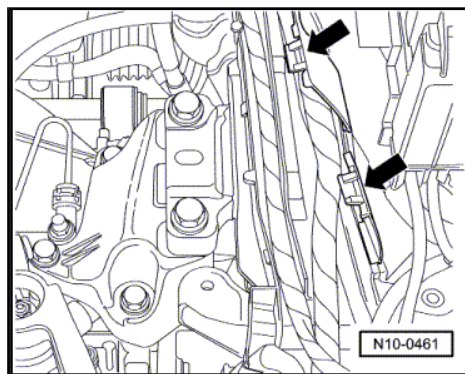
- Remove propshaft ⇒ Gearbox; Rep. Gr. 39 .

Continued for all vehicles

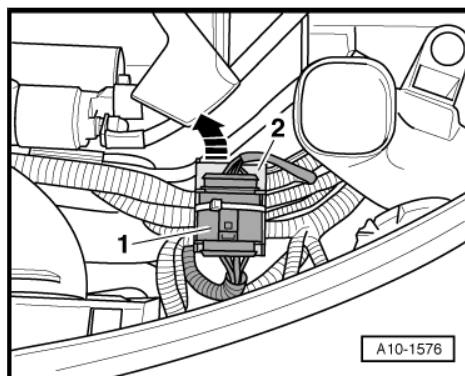
- Removing fan shroud ⇒ [page 135](#) .
- Drain coolant ⇒ [page 114](#) .
- Detach coolant hoses from radiator, heat exchanger and compensation bottle.
- Disconnect the plug of the engine wiring harness from the engine control unit ⇒ [page 230](#) .
- Release duct for engine wiring harness -arrow- and pull out upwards.
- Expose the rear left engine wiring harness at the bulkhead plenum chamber.



- Open the bracket of the cable guide -arrows-.



- Expose the plug connection -1- and disconnect it.
- Open the bracket -2- lying below the cable guide.
- Unclip the engine wiring harness for the control unit from the wiring using the removal tool for inner lining of the door panel -MP8-602/1-.
- Disconnect all plug connections of engine wiring harness/body and lay the engine wiring harness on the engine.



For vehicles with automatic gearbox DSG

- Remove the selector lever control cable from the gearbox ➔ Gearbox; Rep. Gr. 34.

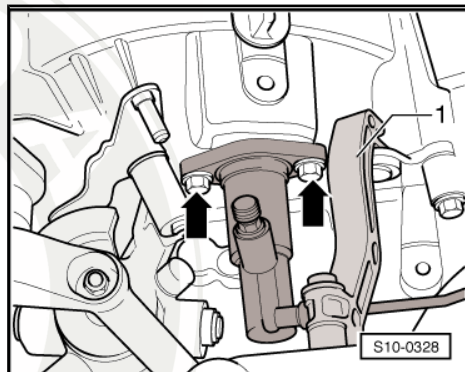
For vehicles with manual gearbox

- Remove shift cable and selector cable with cable support from the gearbox ➔ Gearbox; Rep. Gr. 34.
- Remove strut -1-.
- Remove the slave cylinder -arrows- and tie up aside, do not open the line system.



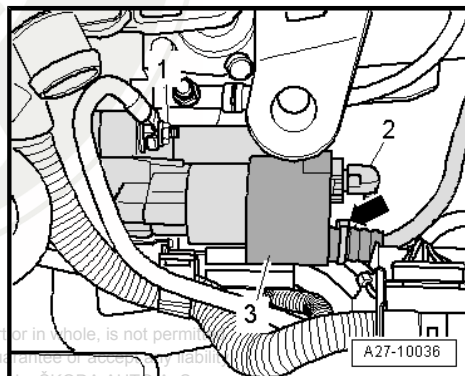
Caution

After removing the slave cylinder, do not depress the clutch pedal. The slave cylinder can be removed in this way.



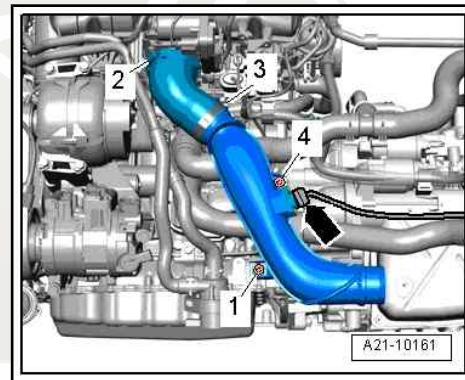
Continued for all vehicles

- Remove the cable strap of the -arrow- protective cover, if present.
- Unbolt earth strap -1-.
- Unplug connector -2-.
- Pull back the protective cover and unscrew the B+ cable from the bracket for the solenoid switch of the starter.



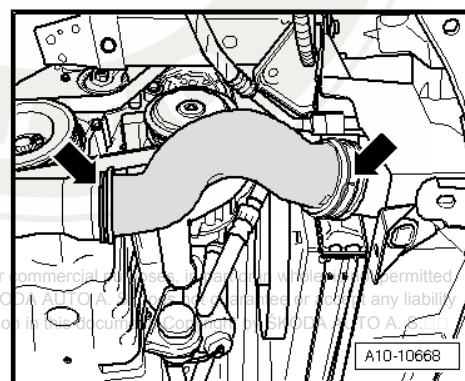
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- Loosen hose clamp -2-.
- Screw out screw -4-.
- Release plug -arrow- and expose the electrical cables.
- Screw out screw -1- and remove charge-air pipe downwards.



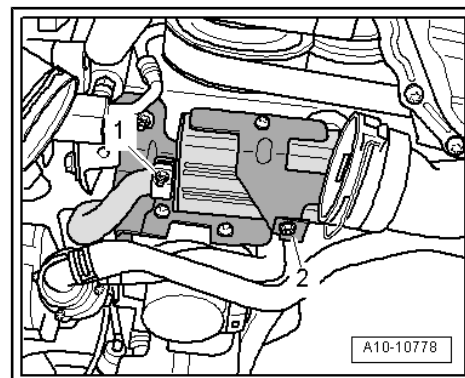
- Remove right charge air hose -arrows-.

Vehicles with auxiliary heating.

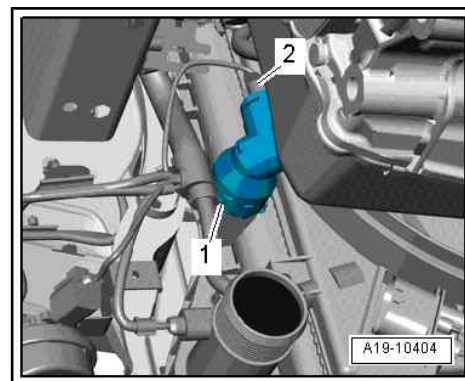


- Slacken the clamp -1- and release the screw -2-.
- Remove silencer for auxiliary heating.

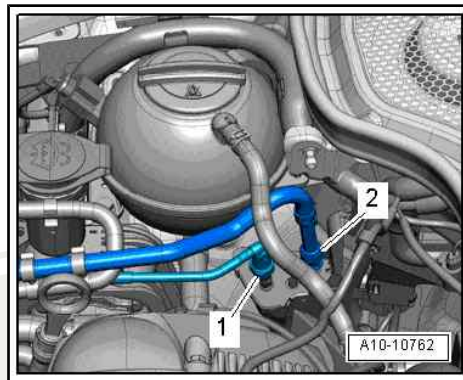
Continued for all vehicles



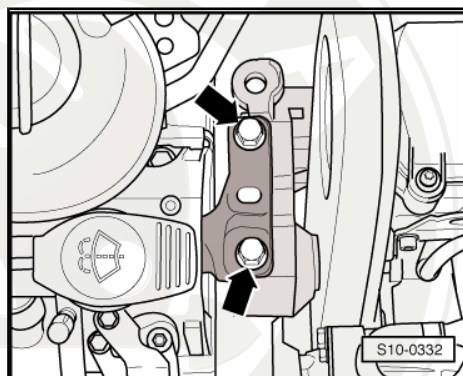
- Detach plug -2- for coolant temperature sender at radiator outlet -G83- and coolant fitting -1-.



- Remove the fuel feed line -2- (press in the securing ring to the top) and catch the fuel which flows out with a cleaning cloth.

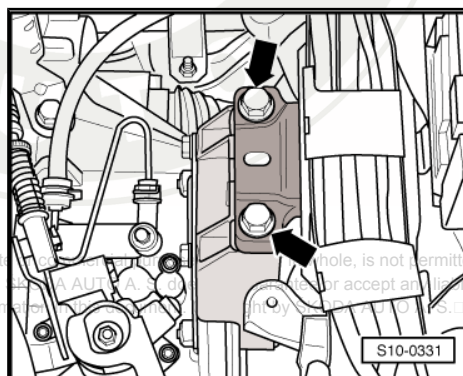


- Slightly loosen the screws -arrows- of the assembly bracket at the engine (less than 1 revolution).



- Slightly loosen the screws -arrows- of the assembly bracket at the gearbox (less than 1 revolution).

- Remove V-ribbed belt ➔ [page 26](#) .



- Disconnect plug connection -1- for magnetic coupling at AC compressor.



WARNING

Risk of injury through refrigerant.

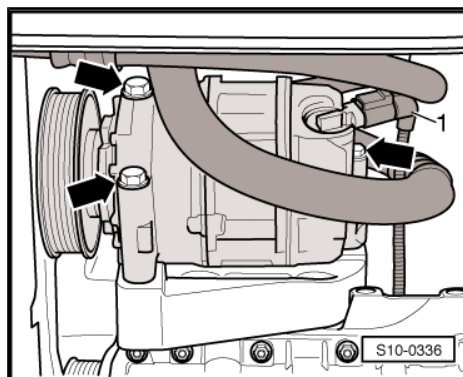
- ◆ *Do not open the refrigerant circuit of the air conditioning system.*



Caution

Risk of damaging refrigerant lines and hoses.

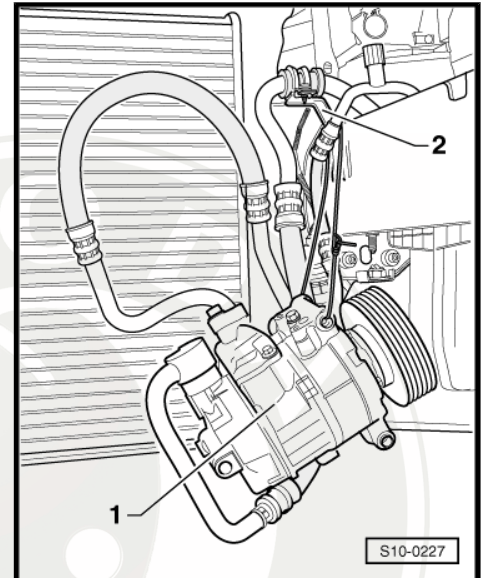
- ◆ *Do not over-tension, buckle or bend refrigerant lines and hoses.*



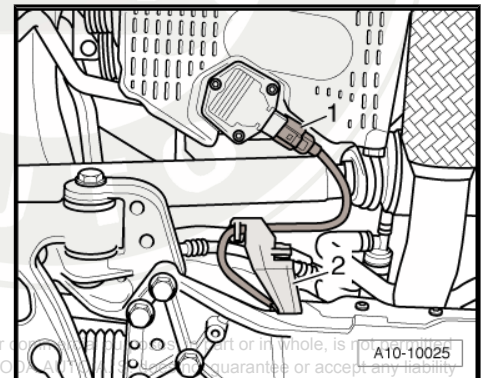
- Release screws -arrows- for AC compressor.



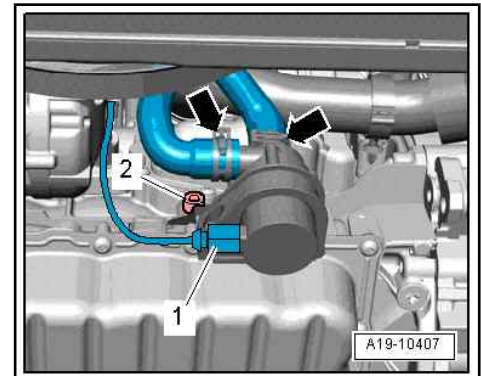
- Attach the air conditioning compressor -1- as shown to the frame side rail holder -2-.



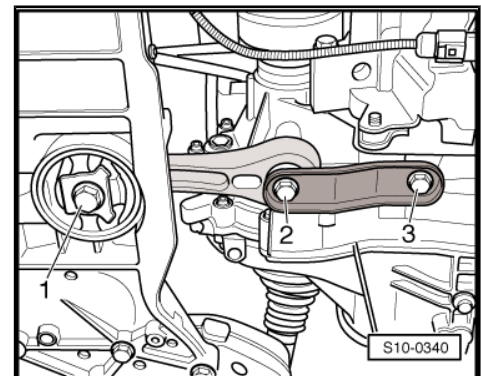
- Disconnect plug -1- for oil level and oil temperature sender -G266- .
- Unclip bracket -2- for electrical cable to oil level and oil temperature sender -G266- at assembly carrier.
- Remove/unclamp all other necessary electrical cables from the engine/gearbox assembly and expose them.
- Unclamp all connecting, coolant, vacuum and suction hoses from the engine.



- Unscrew screw -2- at bracket for pump for coolant after-running -V51- .



- First of all release the screw -1-.
- Then release the screws -2- and -3- and remove the pendulum support.



- Tighten engine mount -T10359- to the cylinder block with bolt -1- to approx. 20 Nm.



Note

The threaded bore for the screw -1- serves to tighten the pump for coolant after-running -V51-.

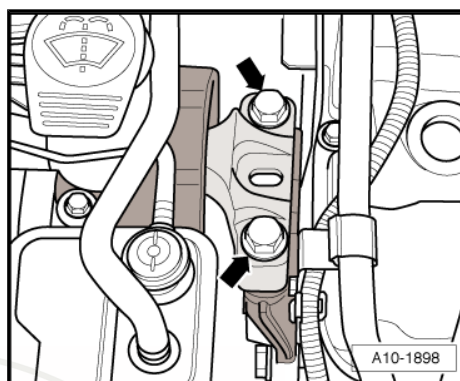
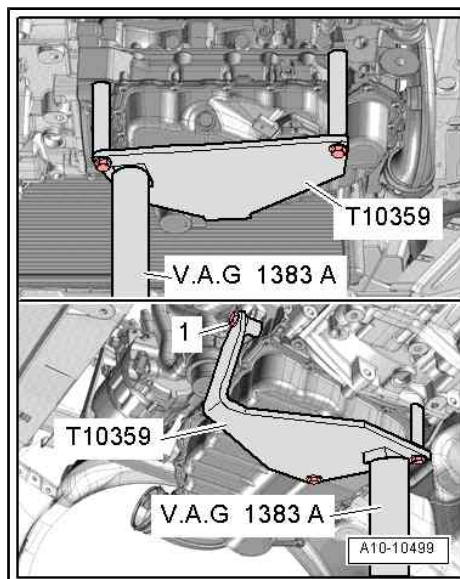
- Insert engine and gearbox jack -V.A.G 1383 A- at engine mount -T10359- and slightly raise.



Note

Use double ladder -VAS 5085- to release the screws for the assembly bracket.

- Release the screws -arrows- of the assembly bracket at the engine.



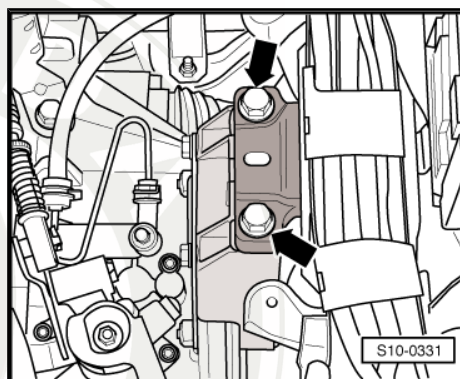
- Release the screws -arrows- of the assembly bracket at the gearbox.



Note

- ◆ Check whether all hose and line connections between engine, gearbox and body are released.
- ◆ When lowering carefully guide the engine/gearbox assembly, in order to avoid damage.

- Lower the engine/gearbox assembly with the help of a 2nd mechanic.
- When lowering, in particular observe the constrictions "AC compressor", "throttle valve" and "exhaust gas turbocharger".
- First slightly lower the engine/gearbox assembly, then pull as far forward as possible, turn to the left and lower further.



1.2 Securing the engine to the assembly stand

Special tools and workshop equipment required

- ◆ Lifting device -MP 9-201 (2024A)-
- ◆ Engine mount -MP 1-202-
- ◆ Assembly stand -MP 9-101-



- ◆ Workshop crane , e.g. -VAS 6100-

Work procedure

- Remove engine/gearbox connecting screws.
- Press gearbox from engine.
- Hook on the lifting device -MP 9-201- as follows and raise the engine with the workshop crane from the engine mount - T10359- .

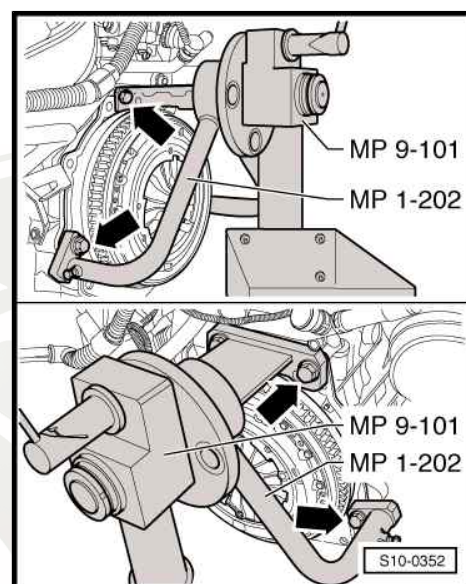
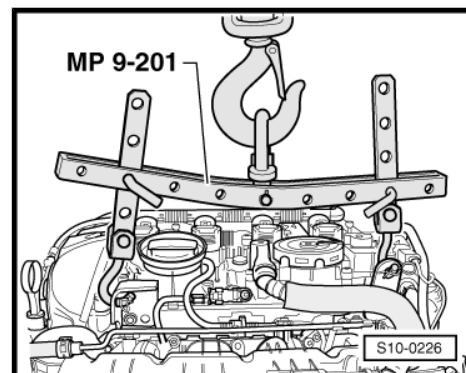


WARNING

Use securing pins on the hooks and rig pins, in order to avoid injuries and damages to the engine.

Secure the engine with engine mount -MP 1-202- on the assembly stand -MP 9-101- before performing assembly work.

- Unscrew gearbox from engine.
- Screw engine mount -MP 1-202- to engine and secure to the assembly stand -MP 9-101- .



1.3 Installing the engine

Installation is carried out in the reverse order. Pay attention to the following:



Caution

When undertaking all installation work, particularly in the engine compartment because of its cramped construction, please observe the following:

- ◆ *Lay lines of all kinds (e.g. for fuel, hydraulic fluid, the active charcoal container-unit, cooling fluid and refrigerant, brake fluid, vacuum) and electrical lines in such a way that the original line guide is re-established.*
- ◆ *In order to avoid damage to the cables, ensure that there is adequate free access to all moving or hot components.*



Note

- ◆ *All cable straps should be fastened again in the same place when installing.*
- ◆ *Secure all hose connections with hose clamps ⇒ Electronic Catalogue of Original Parts .*
- ◆ *Replace the self-locking nuts and screws when undertaking assembly work.*
- ◆ *Replace screws which have been tightened to a torquing angle as well as gasket rings and seals.*
- ◆ *Clean the drive shaft serration and hub serration on used clutch discs, remove corrosion and only apply a very thin layer of grease -G 000 100- onto the serration. Subsequently move the clutch disc up and down on the drive shaft until the hub fits smoothly on the shaft. Remove all excess grease.*

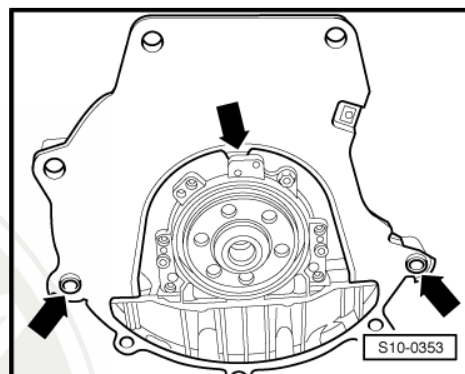
Observe all safety measures and notes for assembly work on the fuel, injection and ignition system and the charge air system as well as rules for cleanliness ⇒ [page 3](#) .

- Insert new dowel sleeves for centering engine/gearbox in the cylinder block.
- Ensure that the intermediate plate has been inserted on the sealing flange and is pushed onto the dowel sleeves -arrows-.

For vehicles with manual gearbox

- Check the centering of the clutch disc ⇒ Gearbox; Rep. Gr. 30 .
- Inspect clutch release bearing for wear, replace if necessary.
- Check and install clutch and clutch control
- Lightly lubricate spline of input shaft with grease -G 000 100- .

For vehicles with automatic gearbox DSG

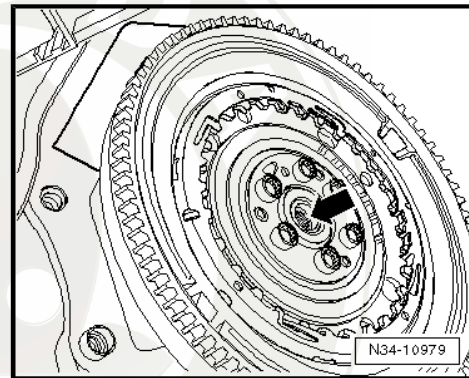




- Replace the needle bearing -arrow- in the crankshaft
⇒ [page 41](#) .
- Attach the selector lever control cable at the gearbox ⇒ Gearbox; Rep. Gr. 34 .

Continued for all vehicles

- Screw on the gearbox to the engine ⇒ [page 20](#) .
- When installing the engine/gearbox assembly, ensure clearance to the assembly carrier as well as to the radiator.
- When swiveling the unit, ensure clearance to the drive shaft.
- Align the engine mounting so that it is stress-free through tapping movements.



Note

- ◆ *Checking and adjusting the assembly bracket* ⇒ [page 22](#) .
- ◆ *Tightening torques of the unit mounting* ⇒ [page 21](#) .

- Install pendulum support ⇒ [page 21](#) .
- Install drive shafts ⇒ Chassis; Rep. Gr. 40 .
- Install AC compressor ⇒ Heating, Air Conditioning; Rep. Gr. 87 .
- Install the V-ribbed belt ⇒ [page 26](#) .
- Install slave cylinder ⇒ Gearbox; Rep. Gr. 30 .
- Attach shift mechanism and adjust if necessary ⇒ Gearbox; Rep. Gr. 34 .
- Fit the plug of the engine wiring harness onto the engine control unit ⇒ [page 230](#) .
- Install pre-exhaust pipe ⇒ [page 237](#) .

Vehicles with four-wheel drive

- Install propshaft ⇒ Gearbox; Rep. Gr. 39 .

Continued for all vehicles

- Install the battery and pay attention to the necessary work after re-connecting the battery ⇒ Electrical System; Rep. Gr. 27 .
- Top up coolant ⇒ [page 114](#) .
- Interrogate all fault memories and delete all fault entries, which are caused by removing and installing the engine ⇒ Vehicle diagnosis, testing and information system VAS 5051.

After deleting the fault memory of the engine control unit the readiness code must be re-generated.

- Perform a test drive.
- Then perform a vehicle system test and if necessary eliminate the resulting faults.



Tightening torques

Component		Nm
Screws and nuts	M6	9
	M7	13
	M8	20
	M10	40
	M12	70
deviations:		
Engine/gearbox connecting screws ⇒ gearbox; Rep. Gr. 34		
Screws for assembly bracket ⇒ page 21 .		

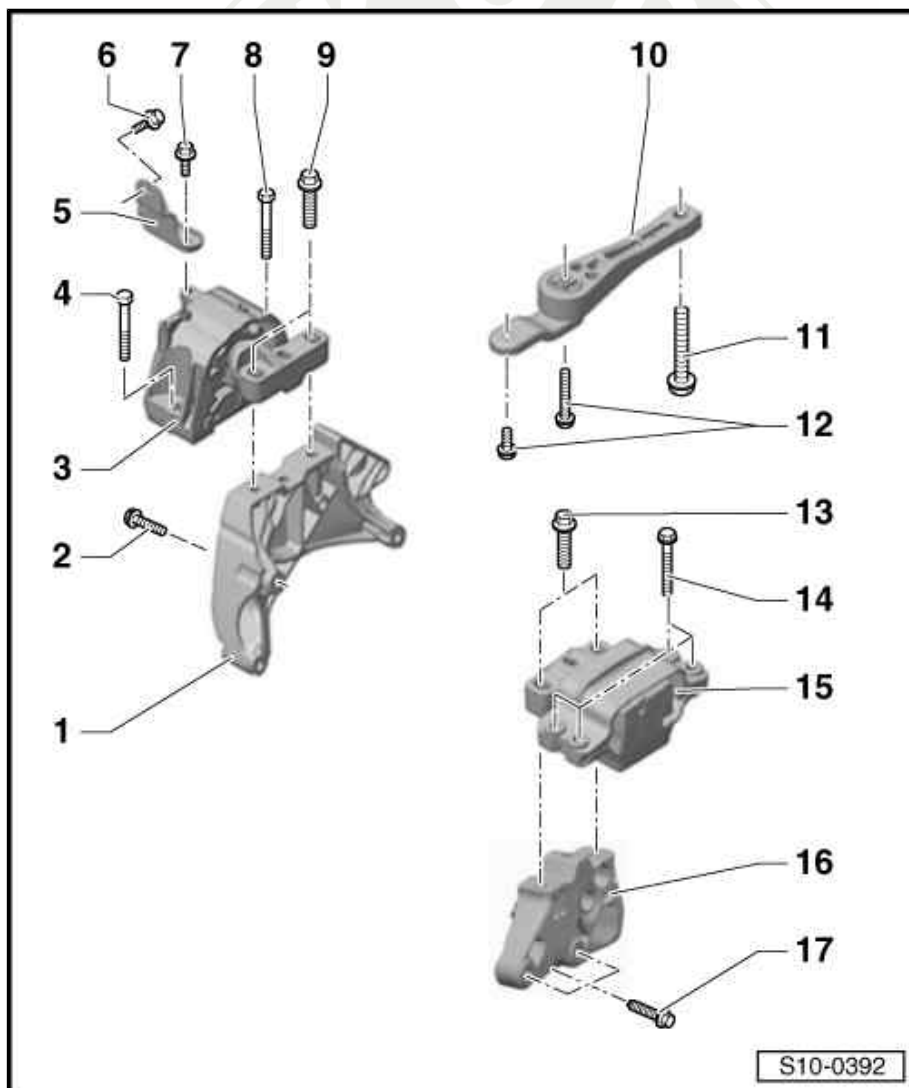


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2 Assembly bracket

2.1 Unit mounting - summary of components

- 1 - Engine support bracket
- 2 - 40 Nm + torque a further 180° (1/2 turn)
☐ replace
- 3 - Engine mounting
- 4 - 40 Nm + torque a further 90° (1/4 turn)
☐ replace
- 5 - Connecting piece
- 6 - 20 Nm + torque a further 90° (1/4 turn)
☐ replace
- 7 - 20 Nm + torque a further 90° (1/4 turn)
☐ replace
- 8 - 40 Nm + torque a further 90° (1/4 turn)
☐ replace
- 9 - 60 Nm + torque a further 90° (1/4 turn)
☐ replace
- 10 - Pendulum support
 - ☐ Removing: First remove screw -11-, then screws -12-.
 - ☐ Installing: First tighten screws -12-, then screw -11-.
- 11 - 100 Nm + torque a further 90° (1/4 turn)
☐ replace
- 12 - Screws
 - ☐ replace
 - ☐ Strength category 8.8: 40 Nm + torque a further 90° (1/4 turn).
 - ☐ Strength category 10.9: 50 Nm + torque a further 90° (1/4 turn).
 - ☐ On manual gearbox MQ350 (02Q), only use the screws with the strength category 10.9 if threaded inserts have been installed (e. g. Heli Coil) ⇒ [page 22](#) .
- 13 - 60 Nm + torque a further 90° (1/4 turn)
☐ replace
- 14 - 40 Nm + torque a further 90° (1/4 turn)
☐ replace





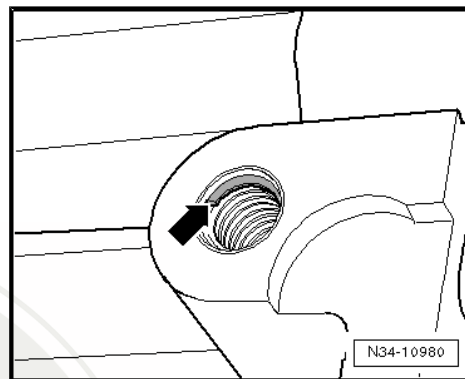
15 - Gearbox mount

16 - Gearbox support bracket

17 - Screw

- Tightening torque ⇒ gearbox; Rep. Gr. 34

Shoulder at first thread turn on installed threaded insert (e.g. Heli Coil)



2.2 Checking and adjusting the assembly bracket

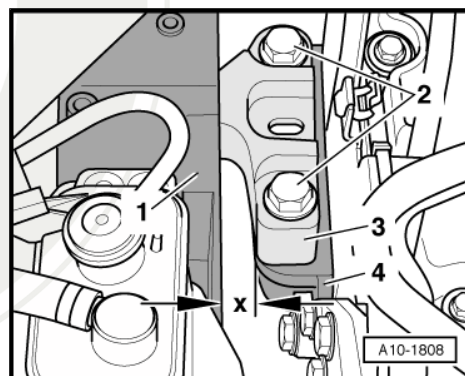
2.2.1 Check setting

- Check dimensions on the right hanger for engine and gearbox:
- Both bolt heads -2- must be positioned parallel to the edge of the supporting arm -3- for engine mount.
- Between engine bracket -1- and engine support -4- there must be a distance -x- = 10 ... 13 mm.



Note

The distance -x- can be checked e.g. with suitable round bars.



Only if there is an acoustic complaint (engine or gearbox knock on the frame side rail when cornering) and the dimension -a- is outside 10 ... 13 mm:

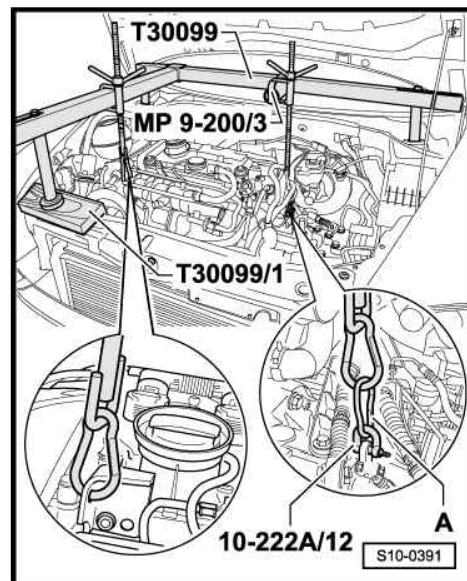
- Adjust the assembly bracket ⇒ [page 22](#).

2.2.2 Adjusting the unit mounting

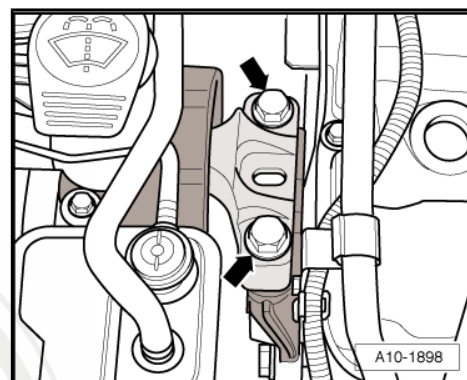
Special tools and workshop equipment required

- ♦ Supporting device -T30099-
- ♦ Shim -T30099/1-
- ♦ Adapter -MP9-200/3 (10-222A/3)-
- ♦ Lifting eye -10-222A/12-
- ♦ Snap hook
- Remove battery and battery tray ⇒ Electrical System; Rep. Gr. 27.

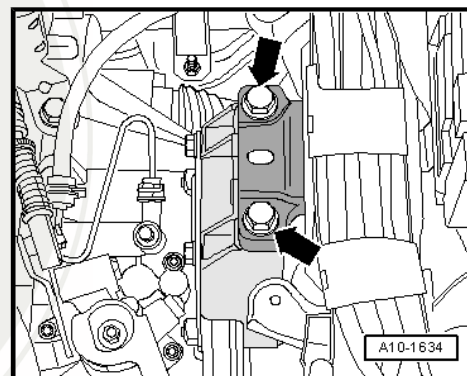
- Install supporting device -T30099- and support engine in fitting position.
- Uniformly pre-tension the engine/gearbox unit with both spin-
dles, but do not raise.



- Release the screws -arrows- of the assembly bracket at the engine.



- Slightly loosen the screws -arrows- of the assembly bracket at the gearbox (less than 1 revolution).
- Successively replace all the screws (as long as it has not already been performed when installing the engine) and insert these loosely.



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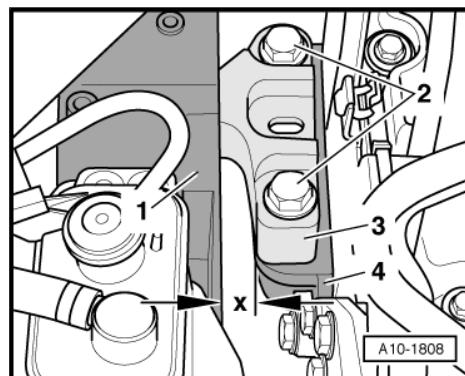


- Move the engine/gearbox assembly with an assembly lever between engine support -1- and supporting arm -3- for engine mount until the following dimensions are set:
- Both bolt heads -2- must be positioned parallel to the edge of the supporting arm -3- for engine mount.
- Between engine bracket -1- and engine support -4- there must be a distance -x- = 10 mm.



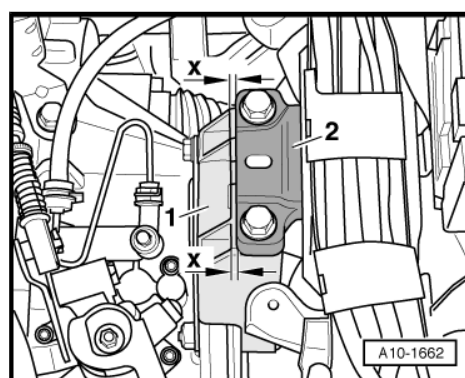
Note

The distance -x- can be checked e.g. with suitable round bars.



- Tighten the screws for the engine side assembly bracket
⇒ [page 21](#) .
- Make sure that on the gearbox side the edges of the supporting arm -2- and gearbox support -1- are parallel.
- The dimension -x- must be the same on both mount sides.
- Tighten the screws for the gearbox side assembly bracket
⇒ [page 21](#) .

Installation is carried out in the reverse order.



13 – Crankgear

1 Cylinder block - Belt pulley side

1.1 V-ribbed belt drive - Summary of components

1 - Vibration damper

- ☐ with V-ribbed belt pulley
- ☐ removing and installing
⇒ [page 30](#)

2 - O-ring

- ☐ replace

3 - 150 Nm + torque a further 90° (1/4 turn)

- ☐ replace
- ☐ to release and tighten
use counterholder -
T10355 -

4 - V-ribbed belt

- ☐ check for wear
- ☐ do not kink
- ☐ pay attention to the correct position on the belt pulley when installing it.
- ☐ removing and installing
⇒ [page 26](#)

5 - Tensioning device for V-ribbed belt

- ☐ swivel tensioning device for V-ribbed belt with open-end wrench to slacken the V-ribbed belt
- ☐ lock with locking pin - T10060 A-
- ☐ Component parts of tensioning device for V-ribbed belt ⇒ [page 26](#)
- ☐ removing and installing
⇒ [page 27](#)

6 - Bracket for auxiliary units

- ☐ with oil filter and engine oil cooler
- ☐ Removing and installing bracket for auxiliary units ⇒ [page 29](#)
- ☐ Removing and installing engine oil cooler ⇒ [page 107](#)

7 - 10 Nm

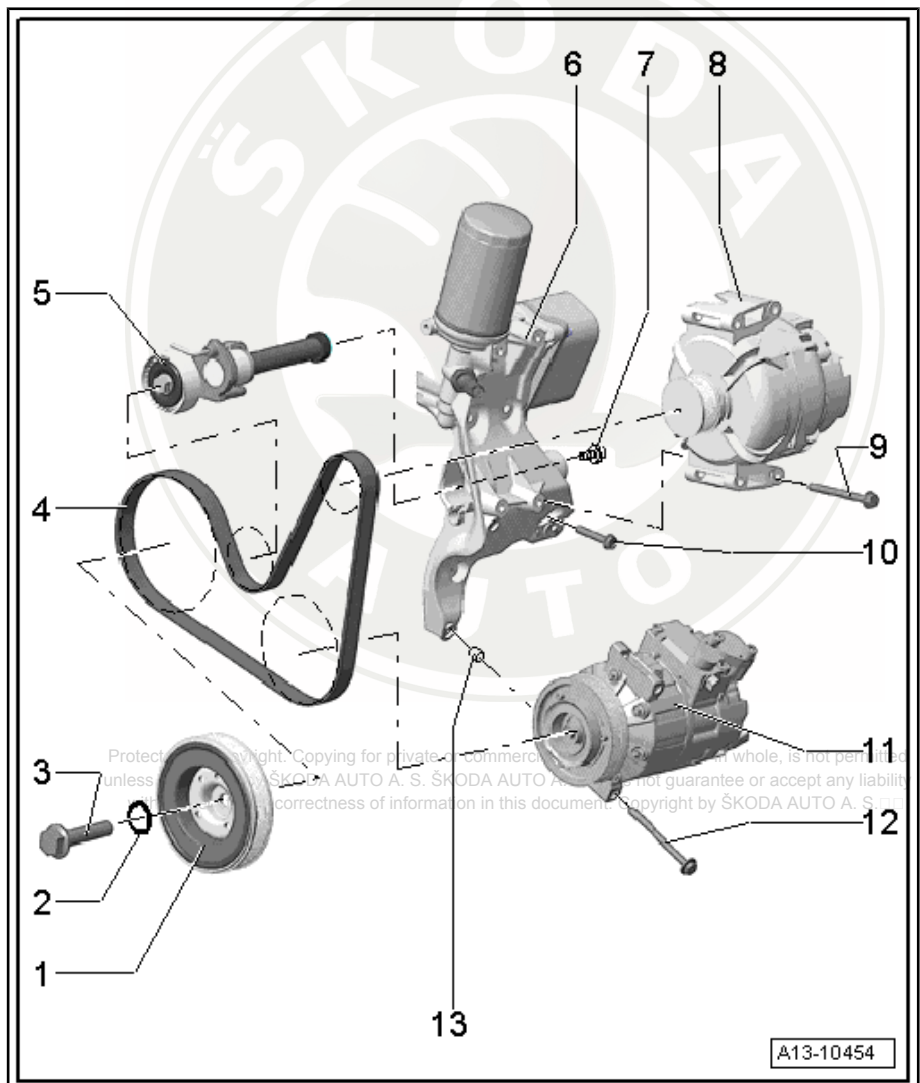
8 - Generator

- ☐ removing and installing ⇒ Electrical System; Rep. Gr. 27

9 - 23 Nm

10 - 20 Nm + torque a further 90° (1/4 turn)

- ☐ replace



- ❑ order of tightening ⇒ [page 26](#)

11 - AC compressor

- ❑ removing and installing ⇒ Heating, Air Conditioning; Rep. Gr. 87

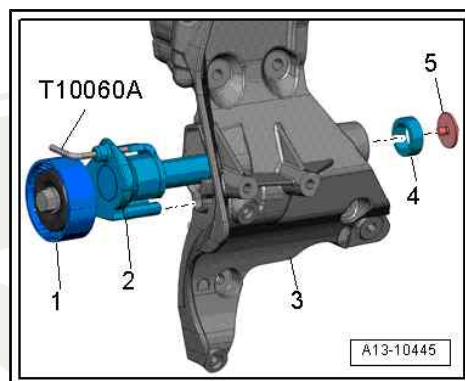
12 - 25 Nm

13 - Fitting sleeve

- ❑ for the AC compressor

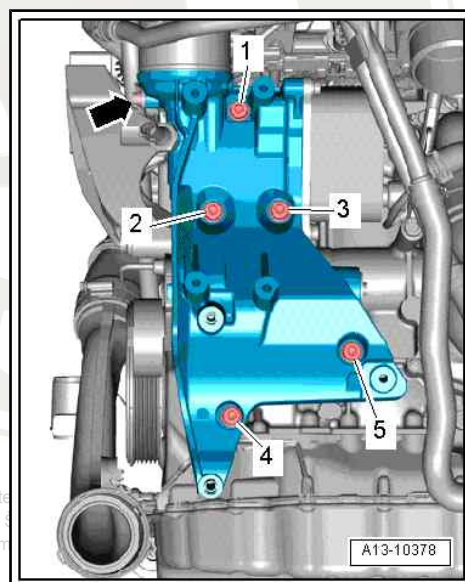
Component parts of tensioning device for V-ribbed belt

- 1 - Tensioning device for V-ribbed belt
- 2 - Supporting piece
- 3 - Bracket for auxiliary units
- 4 - Fitting sleeve
- 5 - Screw



Tightening order of bracket for auxiliary units

- Replace bolts.
- Position the bracket for the auxiliary units and first screw in screw -4-.
- Tighten screws in the order -1...5- in three stages as follows:
 1. Tighten the screws by hand.
 2. Tighten screws to 20 Nm.
 3. Torque screws a further 90° (1/4 turn)



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1.2 Removing and installing V-ribbed belt

Special tools and workshop equipment required

- ◆ Locking pin -T10060 A-

Removing

- Slacken the terminal on the rear side of the activated charcoal reservoir.

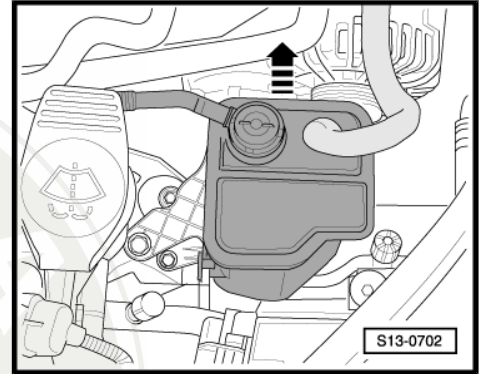


- Detach reservoir with its connected hoses upwards from the bracket -arrow- and lay to the side.

**Caution**

Risk of damage through reversing the rotation direction of an already used V-ribbed belt.

- ◆ ***Mark the direction of rotation with chalk or a felt-tip pen for the re-installation before removing the V-ribbed belt.***



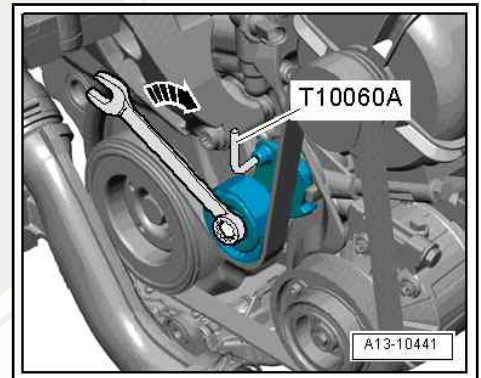
- Loosen the V-ribbed belt by swivelling the tensioning element in -the direction of the arrow-.
- Interlock the tensioning element with the locking pin -T10060 A- .
- Remove the V-ribbed belt.

Install

- Installation is carried out in the reverse order. Pay attention to the following:

**Note**

- ◆ ***Before you install the V-ribbed belt, the generator and the AC compressor must be securely mounted.***
- ◆ ***Pay attention to the correct position and rotation direction of the V-ribbed belt in the belt pulley when installing it.***



Each time work has been completed:

- Start engine and check belt run.

1.3 Removing and installing tensioning device for V-ribbed belt

Special tools and workshop equipment required

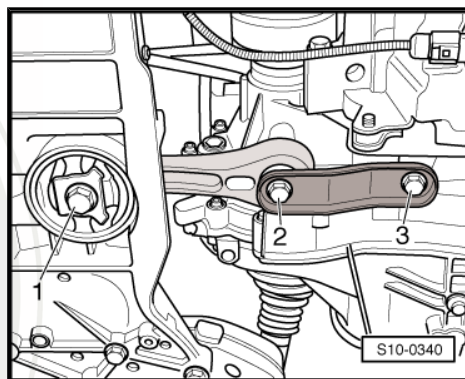
- ◆ Supporting device -MP9-200 (10-222A)-
- ◆ Hook for MP9-200 and T30099 -MP9-200/10 (10-222A/10) -
- ◆ Locking pin -T10060 A-

Removing

- Remove the sound dampening system ⇒ Body Work; Rep. Gr. 50 .
- Remove the front right wheelhouse liner ⇒ Body Work; Rep. Gr. 66 .

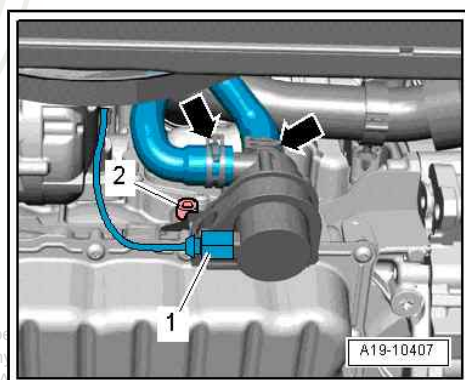


- First of all release the screw -1-.
- Then release the screws -2- and -3- and remove the pendulum support.



- Unscrew screw -2- at bracket for pump for coolant after-running -V51-.

Vehicles with auxiliary heating.

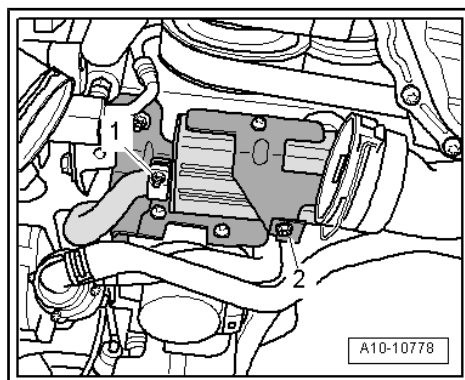


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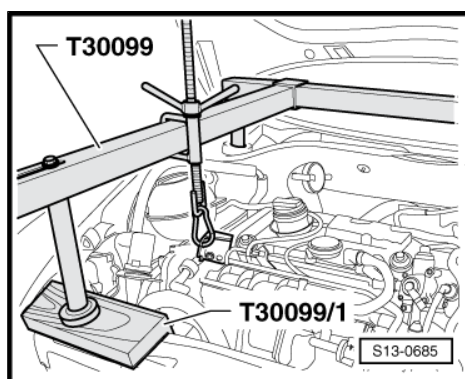
- Slacken the clamp -1- and release the screw -2-.
- Remove silencer for auxiliary heating.

Continued for all vehicles

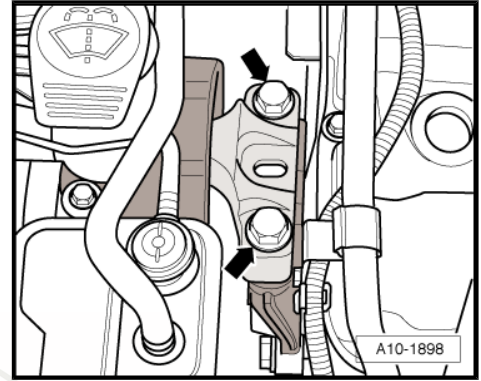
- Remove V-ribbed belt ➔ [page 26](#).
- Remove the cooling water tank cover ➔ Body Work; Rep. Gr. 66.



- Install supporting device -T30099- and support engine in fitting position.



- Release the screws -arrows- of the assembly bracket at the engine.
- Lower the engine by approx. 55 mm (measured at the engine mounting).

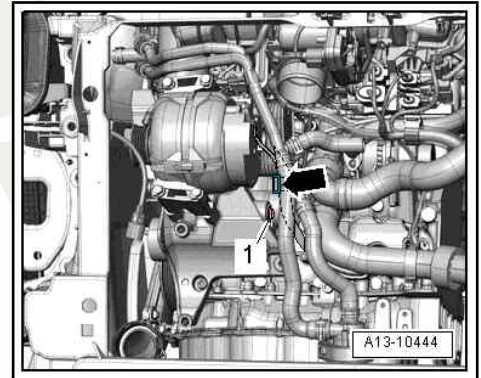


- Expose electrical wiring loom -arrow-.
- Release screw -1- and pull tensioning device for V-ribbed belt off bracket for auxiliary units.

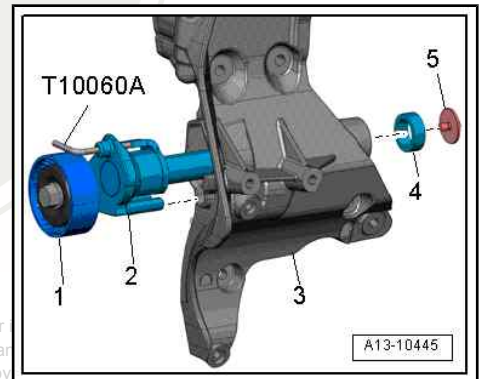
Install

- Tightening torque ⇒ [page 25](#) .

Installation is carried out in the reverse order. Pay attention to the following:



- Guide tensioning device -1- for the V-ribbed belt into the bracket for the auxiliary units -3- and tighten screw -5-.
- Observe the fitting location of the supporting piece -2-: Insert lug of supporting piece into the hole at the bracket for auxiliary units.
- Observe dowel sleeve -4-.
- Install the V-ribbed belt ⇒ [page 26](#) .
- Install pump for coolant after-running -V51- ⇒ [page 118](#) .
- Adjust the assembly bracket ⇒ [page 22](#) .



1.4 Removing and installing bracket for auxiliary units

Removing

- Drain coolant ⇒ [page 114](#) .
- Remove V-ribbed belt ⇒ [page 26](#) .
- Remove alternator ⇒ Electrical System; Rep. Gr. 27 .



- Disconnect plug connection -1- for magnetic coupling at AC compressor.



WARNING

Risk of injury through refrigerant.

- ◆ *Do not open the refrigerant circuit of the air conditioning system.*

- Release screws -arrows- for AC compressor.



Caution

Risk of damaging refrigerant lines and hoses.

- ◆ *Do not over-tension, buckle or bend refrigerant lines and hoses.*

- Tie up AC compressor with connected refrigerant hoses to the frame side rail.
- Release screw -arrow- for guide pipe for the dipstick.
- Release screws -1°...°5- and detach bracket for auxiliary units from coolant pump housing.

Install

- Tightening torques ➔ [page 25](#) .

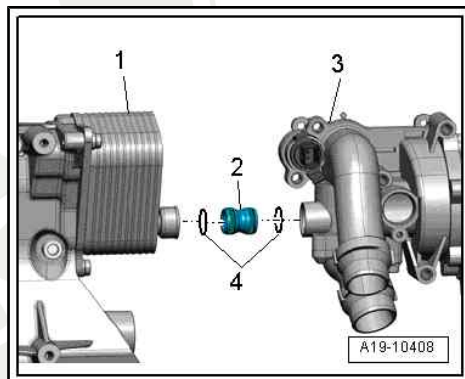
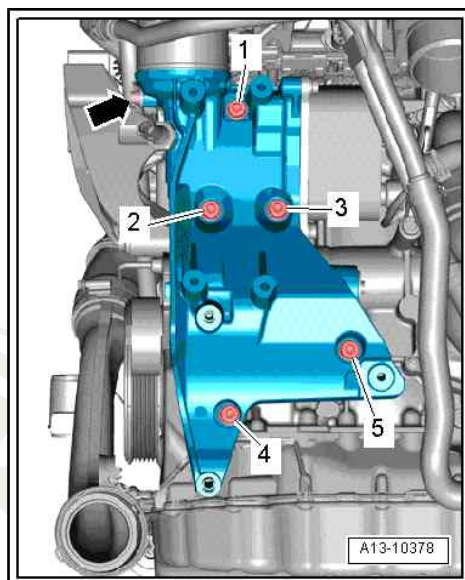
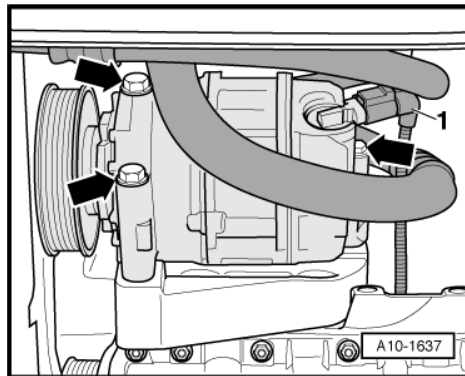
Installation is carried out in the reverse order. Pay attention to the following:



Note

- ◆ *Replace screws which have been tightened to a torquing angle.*
- ◆ *Replace O-rings and gaskets.*

- Moisten O-rings -4- with coolant.
- Insert connecting support -2- into the housing -3- of the coolant pump.
- Push bracket for auxiliary units -1- onto connecting support, position screws and tighten ➔ [page 26](#) .
- Installing AC compressor.
- Install alternator ➔ Electrical System; Rep. Gr. 27 .
- Install the V-ribbed belt ➔ [page 26](#) .
- Top up coolant ➔ [page 114](#) .



1.5 Removing and installing vibration damper

Special tools and workshop equipment required

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◆ Counterholder -T10355 -

Removing

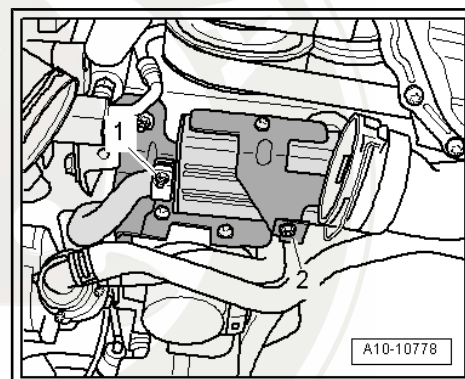
- Remove the sound dampening system ⇒ Body Work; Rep. Gr. 50 .
- Remove the front right wheelhouse liner ⇒ Body Work; Rep. Gr. 66 .

Vehicles with auxiliary heating.

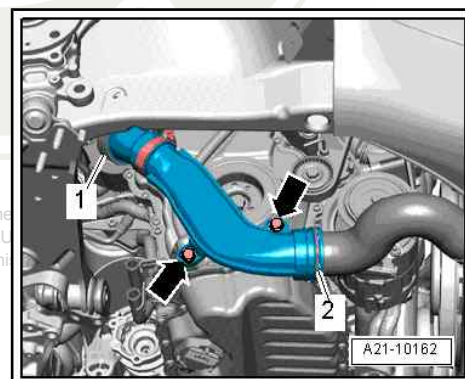
- Slacken the clamp -1- and release the screw -2-.
- Remove silencer for auxiliary heating.

Continued for all vehicles

- Remove V-ribbed belt ⇒ [page 26](#) .



- Screw out screws -arrows-.
- Remove charge-air pipe. To do so lift terminals -1 and 2-.



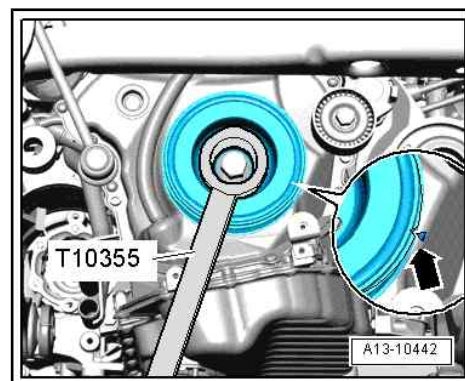
- Turn the vibration damper with the counterholder -T10355- into position "TDC for cylinder 1" -arrow-.
- The notch at the vibration damper must be opposite the arrow marking on bottom cover for timing chain.
- Release screw for vibration damper, to do so use counterholder -T10355- .



Caution

Risk of damage to the engine.

- ◆ *In order not to adjust the timing, the crankshaft must not be turned from the "TDC" position on removed vibration damper.*



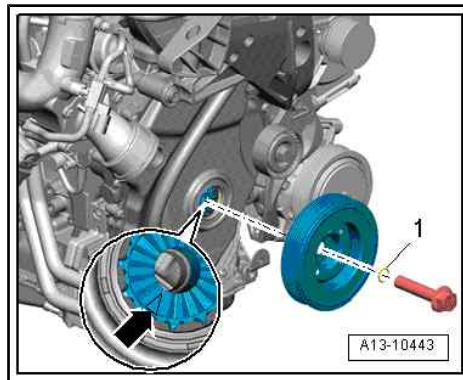
Install

Installation is carried out in the reverse order. Pay attention to the following:



Note

- ◆ *Replace screw for vibration damper.*
 - ◆ *Replace O-ring -1-.*
 - Remove oil residue on the crankshaft journal with a clean cloth.
 - Position vibration damper, while doing so observe tooth contour -arrow- and tighten screw.
- Tightening torque: ➔ [page 25](#)
- Install the V-ribbed belt ➔ [page 26](#) .



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2 Cylinder block - gearbox side



Note

Repairs to the clutch ⇒ gearbox; Rep. Gr. 30.

2.1 Summary of components

1 - Cylinder block

- ☐ removing and installing crankshaft ⇒ [page 38](#)
- ☐ Disassembling and assembling pistons and conrods ⇒ [page 43](#)

2 - Fit pin

3 - Sealing flange on the gearbox side

- ☐ with integrated gasket ring
- ☐ must be replaced completely
- ☐ removing and installing ⇒ [page 35](#)
- ☐ Neither grease nor oil sealing lip of gasket ring
- ☐ before installing remove oil residues on crankshaft journal with a clean cloth

4 - 9 Nm

- ☐ order of tightening ⇒ [page 35](#)

5 - Intermediate plate

- ☐ must be positioned on dowel sleeves
- ☐ do not damage/bend during assembly work
- ☐ inserted on sealing flange on the gearbox side ⇒ [page 34](#)

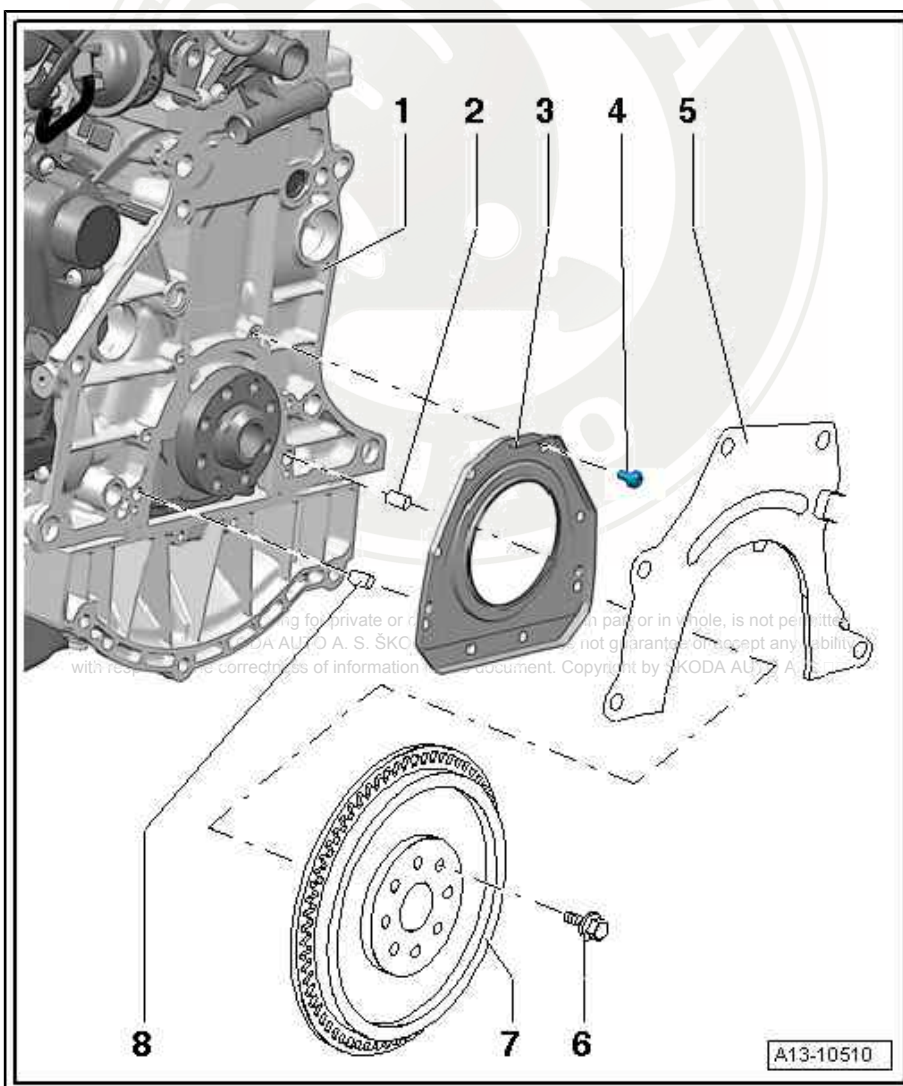
6 - 60 Nm + torque a further 90° (1/4 turn)

- ☐ replace

7 - The two-mass flywheel

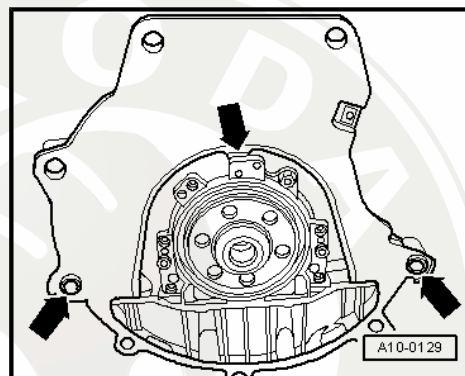
- ☐ removing and installing the two-mass flywheel ⇒ [page 34](#)
- ☐ assembly only possible in one position -holes offset-

8 - Fit pin



Installing intermediate plate

- Insert intermediate plate on sealing flange and push onto the dowel sleeves -arrows-.



2.2 Removing and installing the two-mass flywheel

Special tools and workshop equipment required

- ♦ Counterholder -MP1-223 (3067)-

or

- ♦ Engine mount -MP 1-202 (VW 540)-
- ♦ Bushing -T30010 (VW 540/1B)-
- ♦ Flywheel lock -MP 1-504-

Removing

- Gearbox is removed.
- Remove the clutch ⇒ Gearbox; Rep. Gr. 30 .

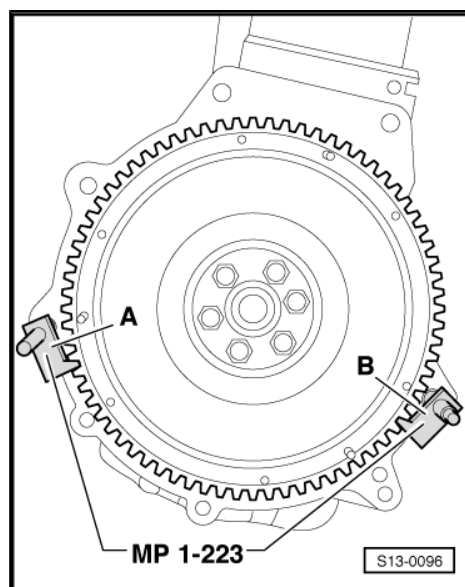
Engine installed

- Insert the counterholder -MP1-223 (3067)- into the bore hole on the cylinder block.
- Fitting position of the tool:

A - for tightening

B - for slackening

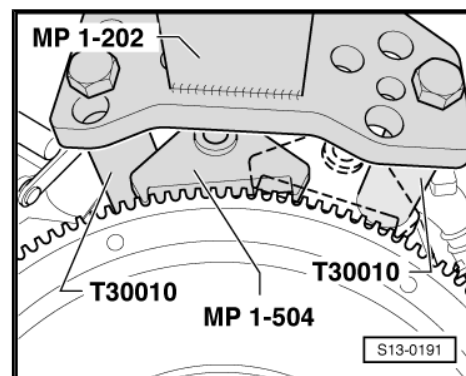
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Engine removed

- Position the flywheel lock -MP 1-504- on the starter ring gear and turn crankshaft until it rests against the bushing -T30010-



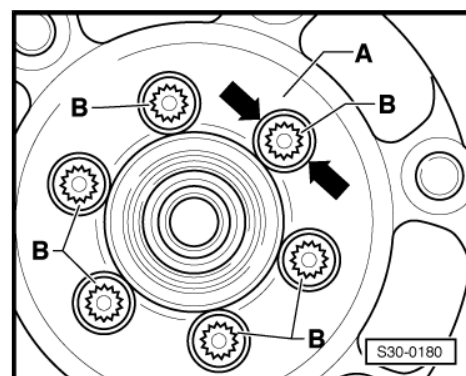
Continued for all

- Rotate the secondary side -A- of the two-mass flywheel in such a way that the screws -B- are positioned in the middle of the holes -arrows-.



Caution

When unscrewing the screws -B-, ensure that no screw head catches on the secondary side -A- of the two-mass flywheel, otherwise it will be damaged.



- Release screws -B- and remove two-mass flywheel.

Install

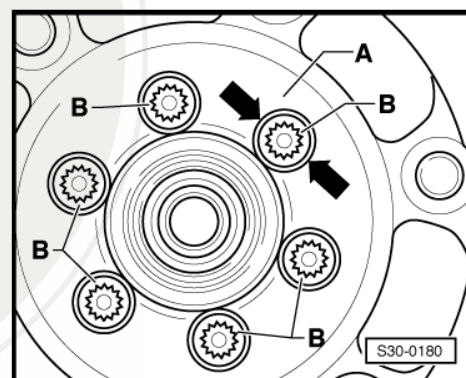
Installation is performed in the reverse order, pay attention to the following points:



Note

Use new screws for attaching.

- Rotate the secondary side -A- of the two-mass flywheel in such a way that the screws -B- are positioned in the middle of the holes -arrows-.
- Screw in all the screws -B- by hand.
 - First of all tighten all the screws -B- crosswise to 60 Nm.
 - Then torque all the screws -B- crosswise a further 90° (1/4 turn.)



2.3 Removing and installing the sealing flange on the gearbox side

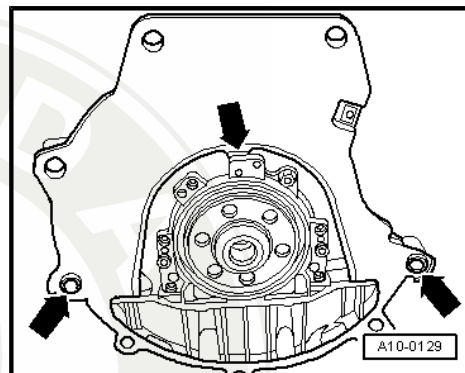
Special tools and workshop equipment required

- ◆ Cleaning and degreasing agent, e.g. -D 000 401 04-
- ◆ Sealant remover gasket stripper (bearing code GST, part number R 34402), manufacturer Retech s.r.o.
- ◆ Silicone sealant -D 174 003 A2-
- ◆ Guide bushing -T20097-

- ◆ Protective goggles
- ◆ Protective gloves

Removing

- Gearbox is removed.
- Remove the two-mass flywheel ➤ [page 34](#) .
- Unhook intermediate plate at the sealing flange on the gearbox side and at the dowel sleeves -arrows-.



- Release screws -1...8-.
- Press off sealing flange on the gearbox side.

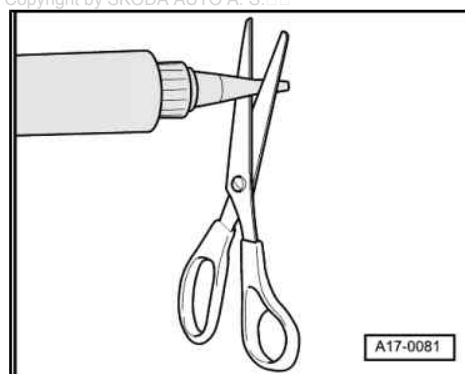
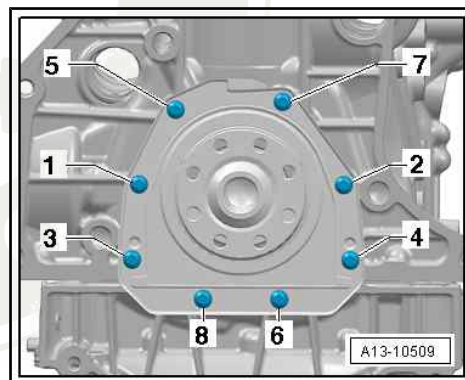
Install



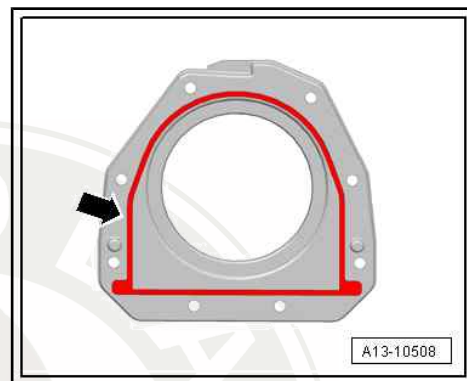
WARNING

Wear protective gloves when working with sealant and grease remover!

- Clear sealant residues from sealing surface on cylinder block and on upper part of the oil pan with chemical sealant remover.
- Degrease the sealing surfaces.
- Cut off nozzle tube at the front marking ($\varnothing$ of nozzle approx. 2 mm).



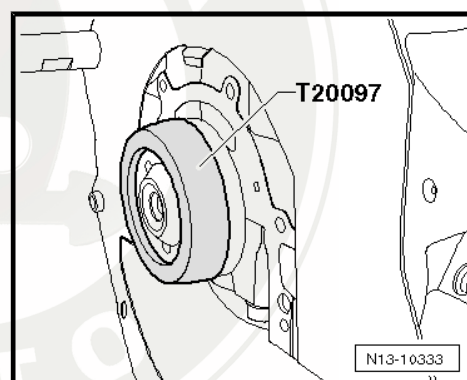
- Apply silicone sealant -arrow- to the clean sealing surface of the sealing flange on the gearbox side as shown in the illustration.
- ◆ Thickness of sealant bead: 2...3 mm



- Insert guide bushing -T20097- on the crankshaft journal.
- Slide sealing flange over the guide bushing -T20097- onto the crankshaft stub.

**Note**

- ◆ *The sealing flange on the gearbox side must be installed within 5 minutes after applying the silicone sealant.*
- ◆ *The sealant bead must not be thicker than recommended otherwise excess sealant may get into the oil pan and clog the strainer in the oil suction pipe.*

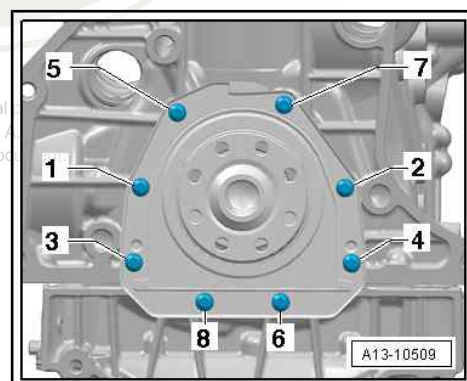


- Immediately position the sealing flange on the gearbox side and tighten the screws in the sequence shown as follows.

1. Tighten the screws by hand.
2. Tighten screws to 9 Nm.

**Note**

After installing the sealing flange on the gearbox side allow the sealant to dry for about 30 minutes. Only then may engine oil be filled in.



Further installation occurs in reverse order.



3 Crankshaft

3.1 Summary of components



Note

If considerable quantities of metal swarf or abrasion is found when carrying out engine repairs, this can be subject to damage to the crankshaft and conrod bearings. In order to avoid consequential damage, after the repair perform the following tasks:

- Carefully clean the oil galleries.
- Replace oil spray jets.
- Replace engine oil cooler.
- Replace oil filter.
- ◆ Before removing the crankshaft, ensure a suitable place is available for placing it down so that the sensor rotor
⇒ [Item 8 \(page 39\)](#) does not rest on anything or get damaged.



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- ◆ Secure the engine with engine mount -MP 1-202- on the assembly stand -MP 9-101- before performing assembly work.

1 - Cylinder block

2 - Bearing shells for cylinder block

- ☐ with lubricating groove
- ☐ do not mix up used bearing shells (mark)
- ☐ Identification
⇒ [page 40](#)

3 - Crankshaft

- ☐ Axial play when new: 0.07...0.23 mm
- Wear limit: 0.30 mm
- ☐ Crankshaft bearing pins: $\varnothing$ 58.00 mm
- ☐ Conrod bearing: $\varnothing$ 47.80 mm
- ☐ the needle bearing is mounted on vehicles with automatic gearbox DSG
- ☐ Pulling the needle bearing out of the crankshaft and driving it in
⇒ [page 41](#)

4 - Bearing shell for bearing cap

- ☐ without lubricating groove
- ☐ do not mix up used bearing shells (mark)
- ☐ Identification
⇒ [page 40](#)

5 - Screw

- ☐ replace
- ☐ order of tightening ⇒ [page 40](#)

6 - Bearing caps

- ☐ Bearing cap 1: belt pulley side
- ☐ retaining lugs of the bearing shells of the cylinder block/bearing cap must be on top of one another

7 - 10 Nm + torque a further 90° ($\frac{1}{4}$ turn)

- ☐ replace

8 - Rotor

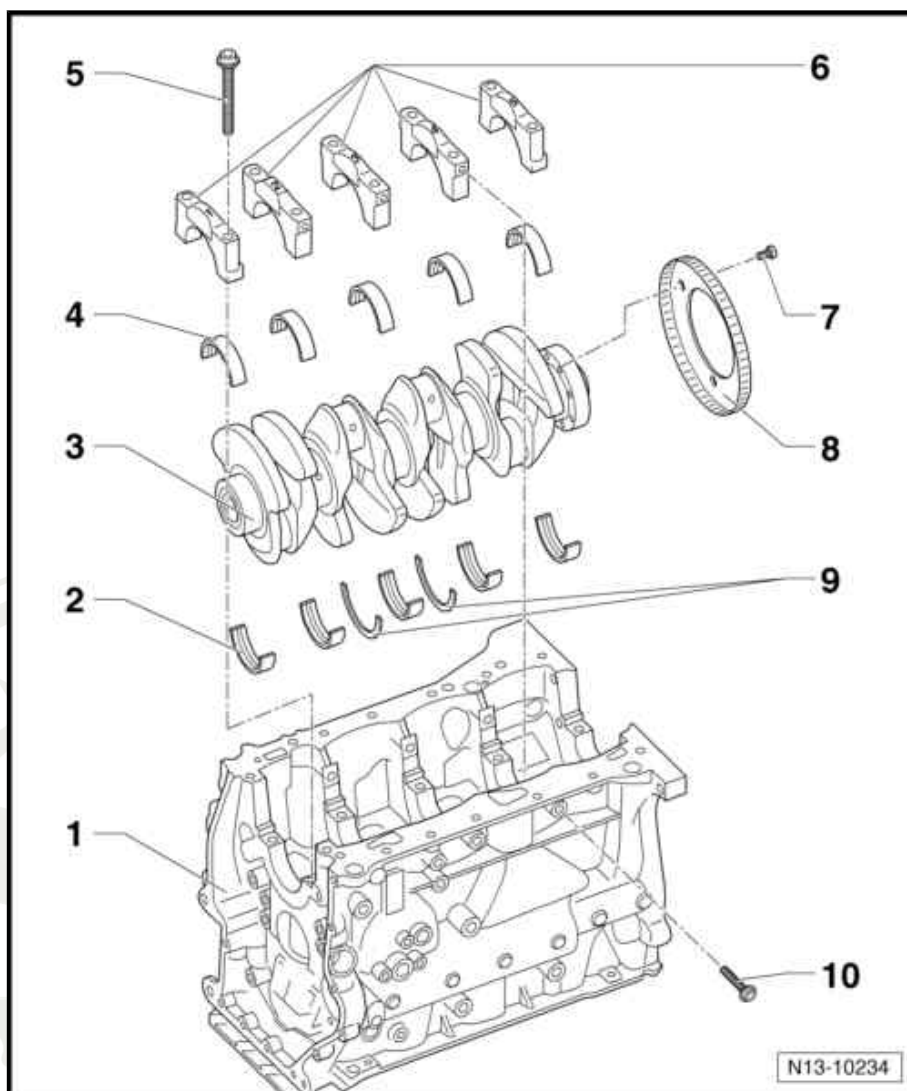
- ☐ for engine speed sender -G28-
- ☐ replace sensor rotor each time the bolts are slackened
- ☐ assembly only possible in one position -holes offset-
- ☐ removing and installing ⇒ [page 40](#)

9 - Thrust washers

- ☐ for bearing 3

10 - Screw

- ☐ replace



N13-10234

❑ order of tightening ➔ [page 40](#)

Removing and installing sensor rotor



Note

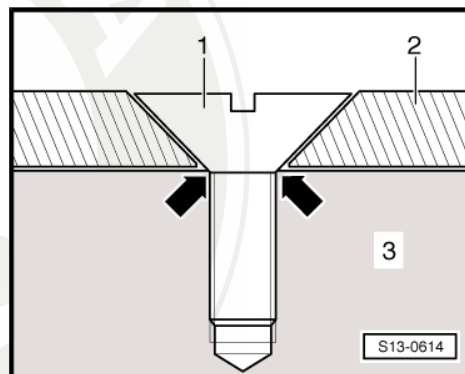
Before removing the crankshaft, ensure a suitable place is available for placing it down so that the sensor rotor does not rest on anything or get damaged.

- Always replace the sensor rotor -2- each time the bolts -1- are slackened.



Note

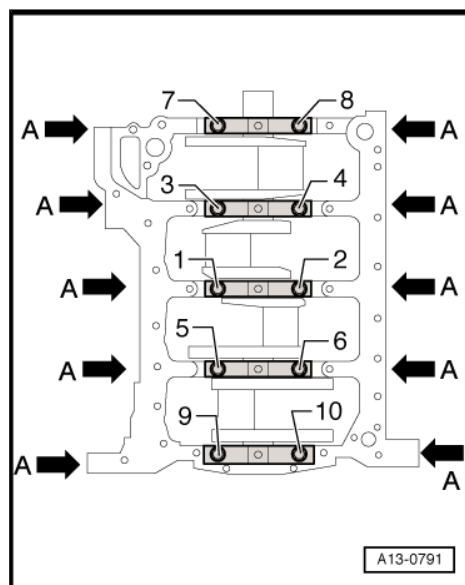
- ◆ *After being attached a second time, the attachment point of the recess head screws in the sensor rotor is sufficiently misshapen that the bolt heads rest against the crankshaft -3- -arrows-. The sensor rotor is positioned loosely below the screws.*
- ◆ *It is only possible to install the sensor rotor in one position, the holes are offset.*



Crankshaft - tightening sequence

- Replace all the screws for the crankshaft and tighten in the sequence -1...5- as follows:

1. Screw in screws -1...10- and -arrows A- by hand.
2. Pre-tighten screws -1...10- to 65 Nm.
3. Tighten screws -1...10- a further 90° with rigid wrench.
4. Pre-tighten screws -arrows A- to 20 Nm.
5. Tighten screws -arrows A- a further 90° with rigid wrench.



3.2 Assign crankshaft bearing shells to the cylinder block

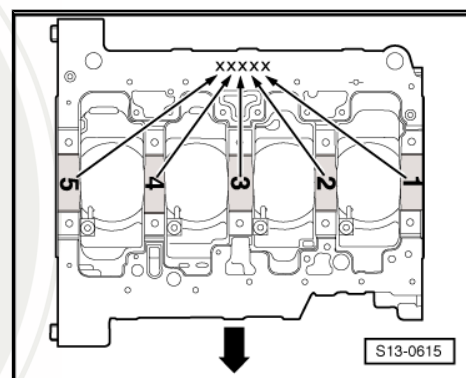
The bearing shells are allocated to the cylinder block with the right thickness at the works. Coloured points on the bearing shell are used to mark the bearing shell thickness.

The bearing shell (upper bearing shell) is to be used at the location which is marked with letters, on the lower sealing surface of the cylinder block or on the front side of the cylinder block (gear-box side).

The bearing shell (lower bearing shell for bearing cover) is to be used at the location which is marked with letters, at the crankshaft.

Cylinder block

The identification of the cylinder block can optionally point towards the sealing surface of the oil pan (-arrow- points in direction of travel) or can be affixed on the front side of the cylinder block (gearbox side).

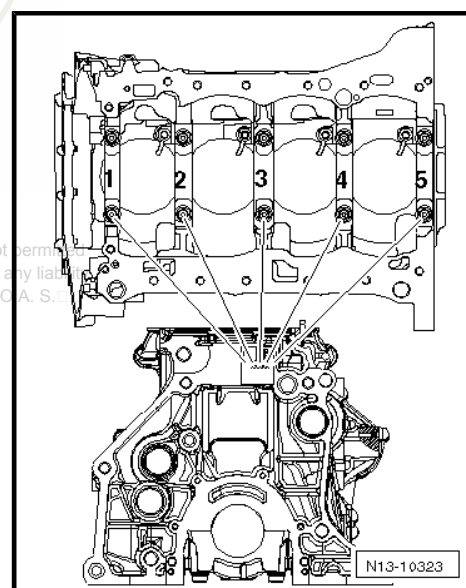


The identification on the cylinder block is valid for the upper bearing shell (bearing shell for the cylinder block).

- Note the characters and select the colour coding to be marked by referring to the table.

Crankshaft

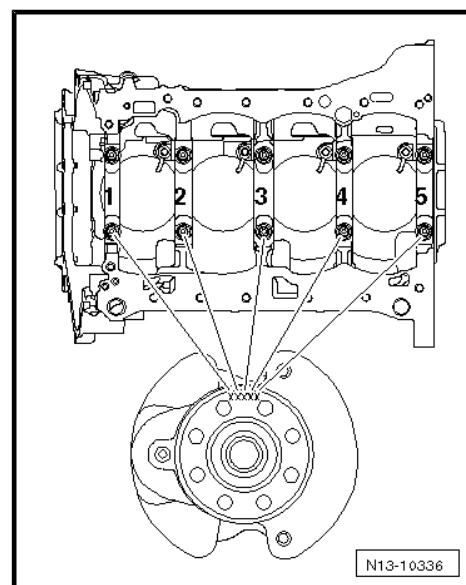
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The identification on the crankshaft is valid for the lower bearing shell (bearing shell for bearing cover).

- Note the characters and select the colour coding to be marked by referring to the table.

Letter		Bearing colour coding
S	=	black
R	=	red
B	=	blue
G	=	yellow
W	=	white



3.3 Pulling the needle bearing out of the crankshaft and driving it in

Special tools and workshop equipment required

- ◆ Interior extractor -Kukko 21/2-



- ◆ Support -Kukko 22/1-
- ◆ Centering mandrel -T 30029-



Note

Only on vehicles fitted with automatic gearbox DSG.

Removing

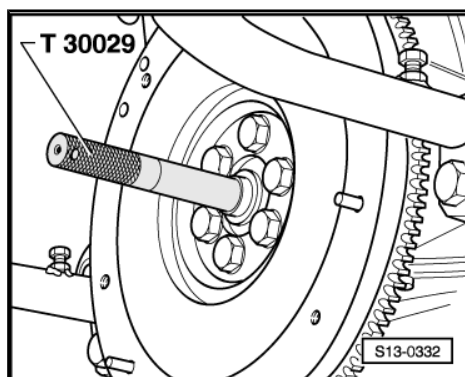
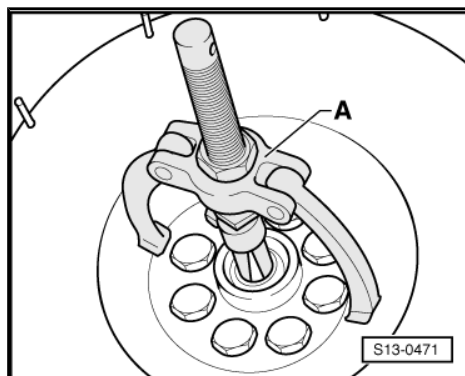
- Pull out e.g. Kukko 21/2 and Kukko 22/1 with interior extractor with support -A-.

Install

Fitting position of the needle bearing:

- ◆ The marked side of the needle bearing should be visible when in its installed condition.

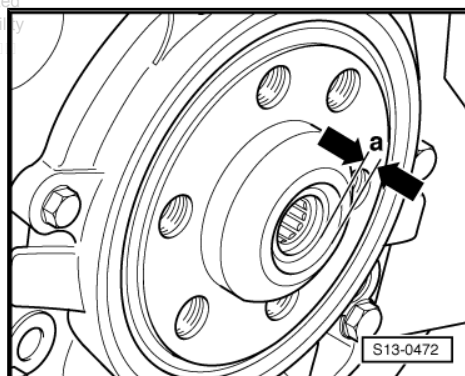
- Drive in using a centering pin -T 30029-



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Depth of installation of the needle bearing:

- ◆ Dimension a = 2 mm.



4 Pistons and conrods

4.1 Summary of components

1 - Conrod bolt, 30 Nm + torque a further + 90° (1/4 turn)

- ☐ replace
- ☐ oil thread and head contact surface

2 - Conrod bearing cap

- ☐ Check fitting position
- ☐ as a result of the conrods separated in the cracking process, the cover fits only in one position and only to the relevant conrod
- ☐ mark matching cylinder -A-
- ☐ Fitting position: Markings -B- point towards the belt pulley side

3 - Bearing shells

- ☐ pay attention to correct installation position
⇒ [page 44](#)
- ☐ do not mix up used bearing shells
- ☐ Axial play when new: 0.10...0.35 mm

Wear limit: 0.4 mm

4 - Pressure relief valve, 27 Nm

- ☐ Opening pressure: 0.16...0.19 MPa (1.6...1.9 bar) overpressure

5 - Oil injection nozzle

- ☐ for piston cooling

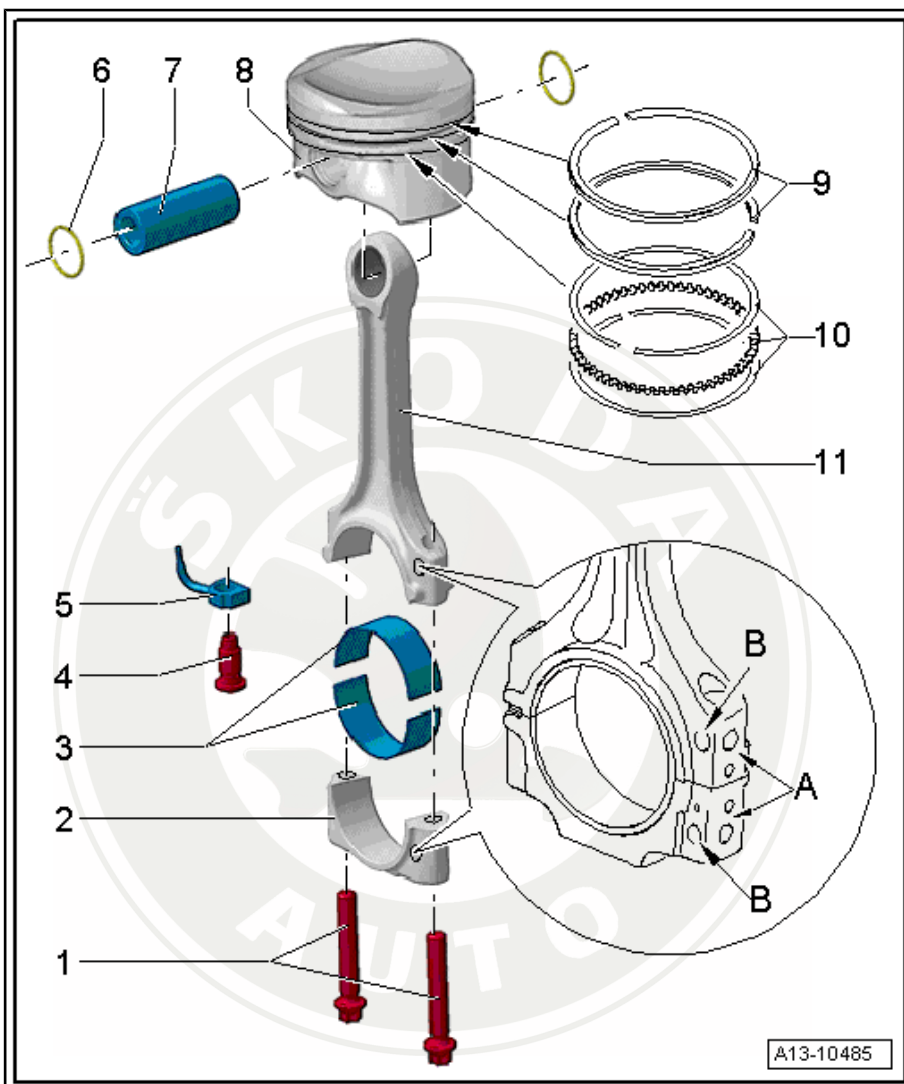
6 - Circlip

7 - Piston pin

- ☐ if stiff, heat piston to 60°C
- ☐ use drift -VW 222 A- for removing and installing

8 - Piston

- ☐ mark installation position and matching cylinder
- ☐ arrow on piston crown faces towards the belt pulley
- ☐ use piston ring tensioning strap for installing
- ☐ check ⇒ [page 45](#)
- ☐ inspect cylinder bore ⇒ [page 45](#)
- ☐ Piston Ø: 82.465 mm (nominal dimension)
- ☐ Cylinder Ø: 82.51 mm (nominal dimension)



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9 - Gasket rings

- ☐ Offset joint 120°
- ☐ use piston ring pliers for removing and installing
- ☐ marking "TOP" must face to the top towards piston crown
- ☐ Inspect gap clearance ➔ [page 44](#)
- ☐ Inspect end clearance ➔ [page 45](#)

10 - Oil scraper ring

- ☐ 2 part
- ☐ Install joint with 120° offset to the neighboring compression ring
- ☐ Inspect gap clearance ➔ [page 44](#)
- ☐ End clearance cannot be measured

11 - Conrod

- ☐ with a split bearing cap
- ☐ replace as a set only
- ☐ mark matching cylinder -A-
- ☐ Fitting position: Markings -B- point towards the belt pulley side
- ☐ separate new conrod ➔ [page 46](#)

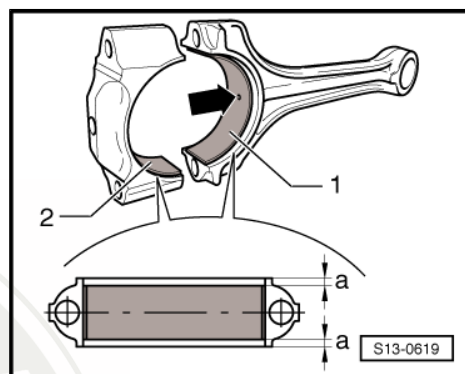
Bearing shell installation position

Bearing shell -1- with oil drilling -arrow- for conrod.

Bearing shell -2- without oil drilling for conrod bearing cap.

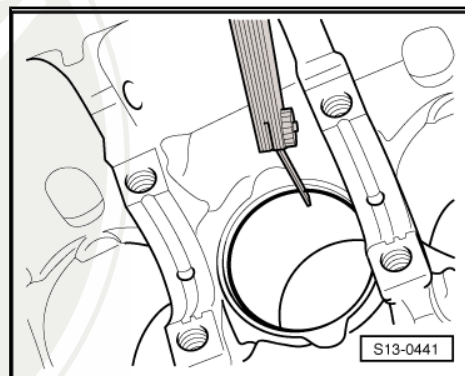
- Insert bearing shells in the conrod and in the conrod bearing cap centred.

The dimension -a- must be the same on the right and left.



4.2 Inspect piston, piston rings and cylinder bore

Inspecting piston ring gap clearance



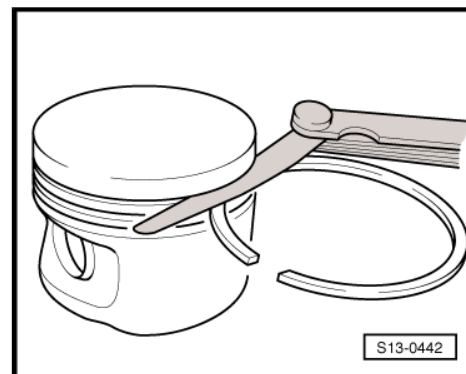
Special tools and workshop equipment required

- ◆ Feeler gauges

- Insert ring at right angles from above down into the lower cylinder opening, about 15 mm away from edge of cylinder.

Piston ring		Gap clearance	
		new	Wear limit
Gasket rings	mm	0,20 ... 0,40	0,8
Oil scraper ring	mm	0,25 ... 0,50	0,8

Inspect piston ring end clearance

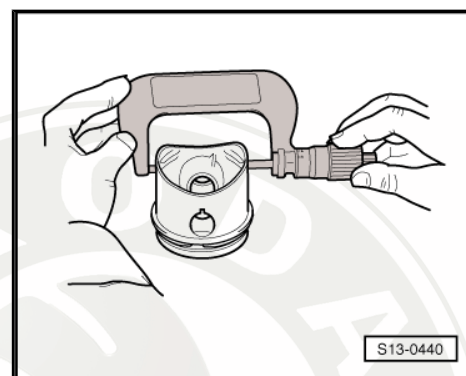


Special tools and workshop equipment required

- ◆ Feeler gauges
- Clean ring groove before inspecting.

Piston ring		End clearance	
		new	Wear limit
Gasket rings	mm	0,06 ... 0,09	0,20
Oil scraper ring	mm	0,03 ... 0,06	0,15

Inspecting pistons

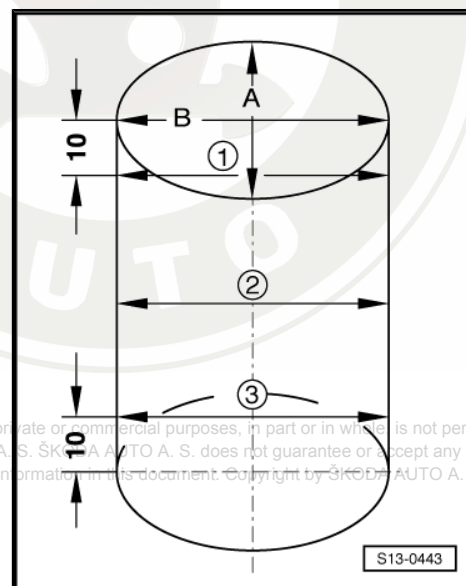


Special tools and workshop equipment required

- ◆ External micrometer 75...100 mm
- Measure about 10 mm from the lower edge and offset 90° to piston pin axis.

Deviations from specified dimension: max. 0.04 mm

Inspecting cylinder bore



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Special tools and workshop equipment required

- ◆ Internal precision measuring instrument 50...100 mm
- Measure at 3 points crosswise in a transverse direction -A- and lengthwise -B-.

Deviations from specified dimension: max. 0.08 mm



Note

Do not measure the cylinder bore if the cylinder block is fixed to the assembly stand -MP 1-202- with the engine mount -MP 9-101-, as this may result in incorrect measurements.

4.3 Separating new conrod

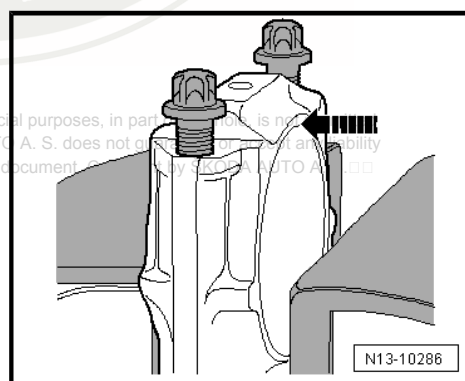
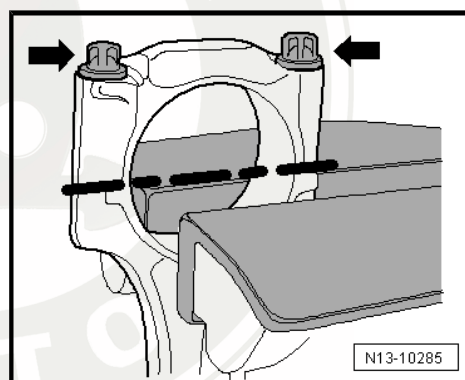
It can happen that on new conrods, the provided separation point is not completely cracked. If the conrod bearing cap cannot be removed by hand, then proceed as follows:

- Mark the assignment of the conrod to the cylinder.
- Slightly tension the conrod, as shown in the illustration, in a vice provided with aluminium protective jaws.



Note

- ◆ *Only tension the conrod slightly in order to avoid damage.*
- ◆ *The conrod is clamped beyond the broken line.*
- Release both screws -arrows- by approx. 5 turns.
- Carefully knock against the conrod bearing cap with a rubber hammer in -direction of arrow- in order to loosen it.



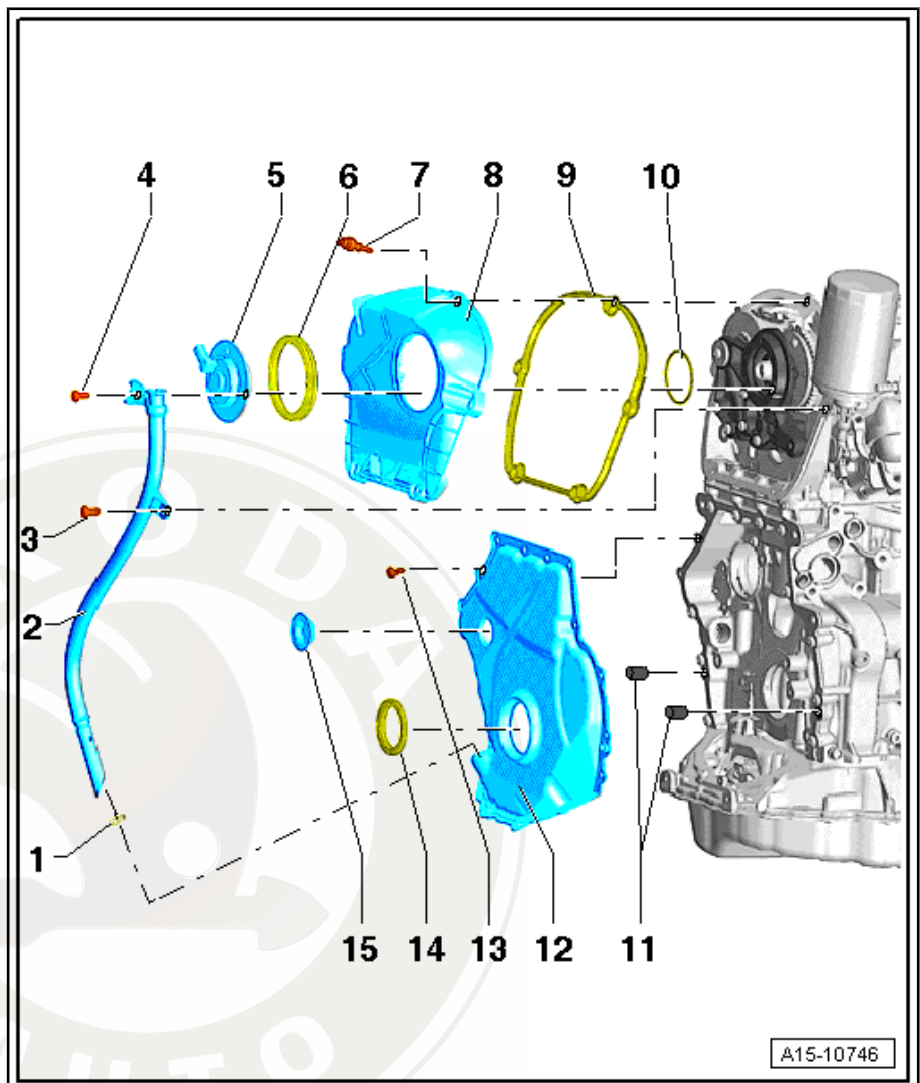
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15 – Cylinder Head, Valve Gear

1 Covers for timing chains

1.1 Covers for timing chains - Summary of components

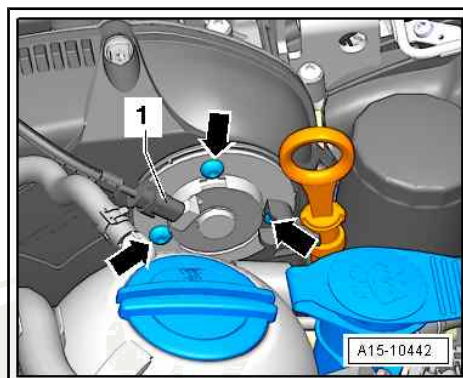
- 1 - O-ring
 - ☐ replace
 - ☐ oil before assembly
- 2 - Guide pipe for the dipstick
- 3 - 9 Nm
- 4 - 9 Nm
- 5 - Camshaft adjustment valve 1-N205 -
- 6 - Sealing ring
 - ☐ oil before assembly
 - ☐ replace if damaged
- 7 - 9 Nm
 - ☐ Captive screw
 - ☐ order of tightening [⇒ page 48](#)
- 8 - Top cover for timing chain
 - ☐ removing and installing [⇒ page 48](#)
- 9 - Sealing ring
 - ☐ replace if damaged
- 10 - O-ring
 - ☐ replace
 - ☐ oil before assembly
- 11 - Dowel pins
 - ☐ Centre cover
- 12 - Bottom cover for timing chain
 - ☐ removing and installing [⇒ page 48](#)
- 13 - 8 Nm + torque a further 45° (1/8 turn)
 - ☐ replace
 - ☐ order of tightening [⇒ page 48](#)
- 14 - Sealing ring
 - ☐ for vibration damper
 - ☐ replace [⇒ page 53](#)
- 15 - Plug
 - ☐ replace



1.2 Removing and Installing top cover for timing chain

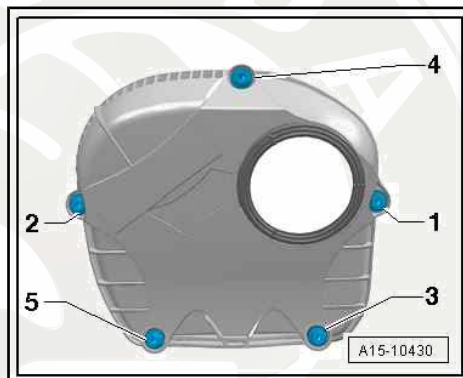
Removing

- Disconnect the plug from the camshaft adjustment valve 1 - N205- -1-.
- Release screws -arrows- and remove camshaft adjustment valve 1 -N205- .



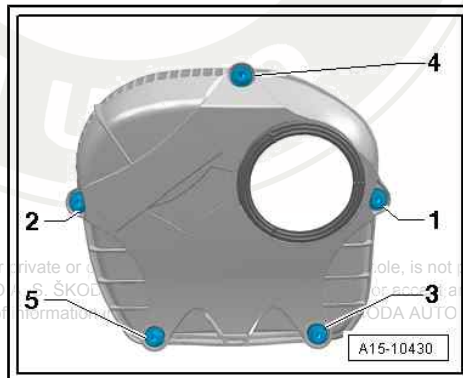
- Release screws -1 through 5- and remove top cover for timing chain.

Install



Installation is carried out in the reverse order. Pay attention to the following:

- Tighten new screws in the sequence -1 through 5- shown to 9 Nm.
- Oil gasket ring and O-ring for camshaft adjustment valve 1 - N205- with engine oil.
- Tighten screws to 9 Nm.



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1.3 Removing and Installing bottom cover for timing chain

Special tools and workshop equipment required

- ◆ Thrust piece -T10368-
- ◆ Bits XZN 12 -T10099-
- ◆ Protective goggles
- ◆ Protective gloves
- ◆ Feeler gauges
- ◆ Silicone sealant -D 174 003 A2-
- ◆ Cleaning and degreasing agent , e.g. -D 000 401 04-



- ◆ Sealant remover gasket stripper (bearing code GST, part number R 34402), manufacturer Retech s.r.o.

Removing

- Drain engine oil.
- Remove vibration damper ⇒ [page 30](#) .



Caution

In order not to damage the serration, only screw in screw for vibration damper with pressure plate -T10368- .

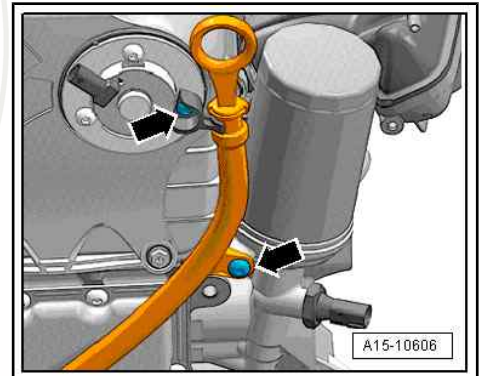
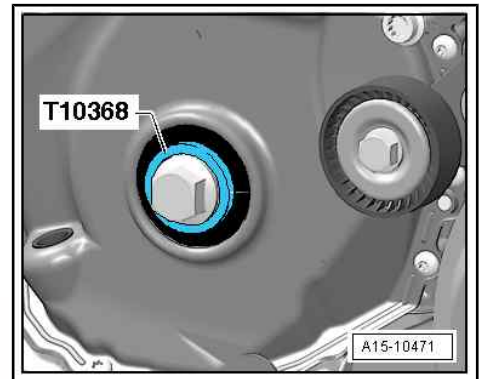
- Screw in again screw for vibration damper with pressure plate -T10368- .



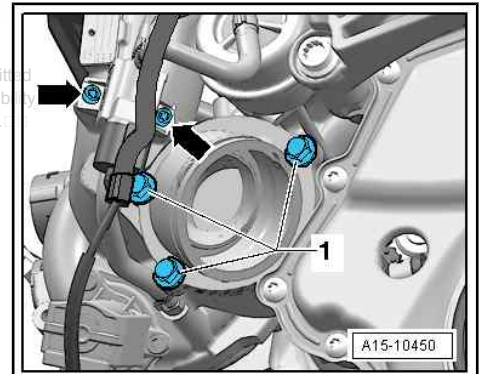
Note

This work step is important because otherwise the chain sprocket can slide from the crankshaft and the entire chain drive must be adjusted again.

- Remove the bracket for auxiliary units ⇒ [page 29](#) .
- Release the lower screws for engine support with bits - T10099- .
- Remove engine mounts ⇒ [page 21](#) .
- Raise engine approx. 105 mm with the spindle (approx. 50 mm from fitting position).
- Release upper screw for engine support.
- Remove engine support with inserted screws.
- Screw out screws -arrows- and pull the guide pipe for the oil dipstick out of the bottom cover for timing chain.

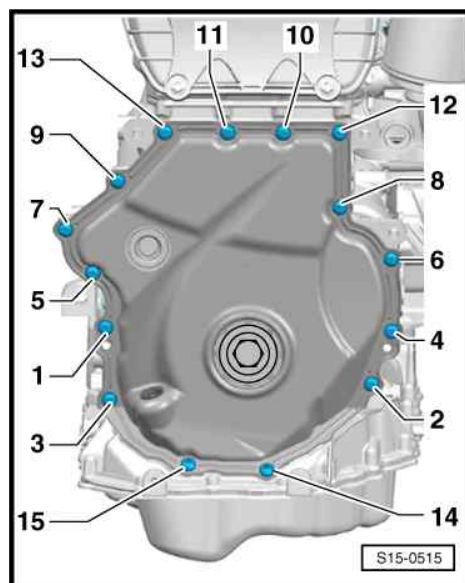


- Unscrew charge pressure control solenoid valve -N75- from exhaust turbocharger -arrows-.
- Remove support for turbocharger -1-.





- Release screws -1...15-.



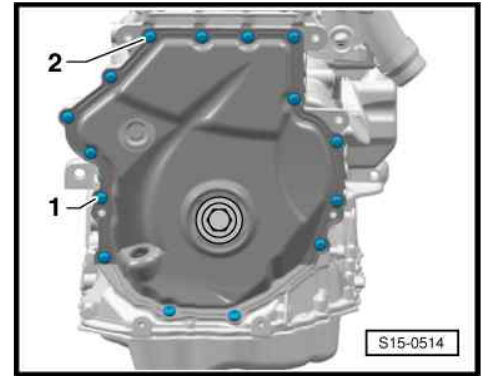
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- Lever off bottom cover for timing chain, to do so begin with -1 and 2-.

**Caution**

In order to avoid deformation, do not grip between the screw points.

**Install****Note**

- ◆ *Pay attention to the use by date on the silicone sealant.*
- ◆ *The bottom cover for timing chain must be installed within 5 minutes after applying the silicone sealant.*
- ◆ *Replace screws which have been tightened to a torquing angle.*
- ◆ *Replace gasket rings, gaskets and self-locking nuts.*
- Remove gasket ring for vibration damper from the bottom cover for timing chain.

**WARNING**

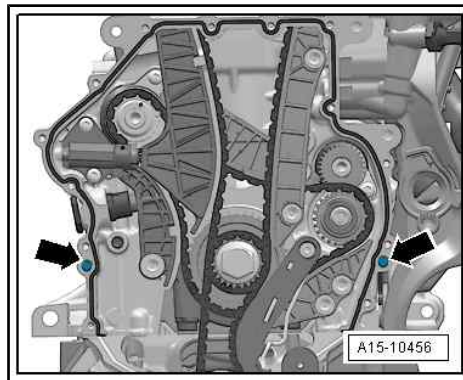
Wear protective gloves when working with sealant and grease remover!

- Remove residual sealant from the sealing surface on the cylinder block, the upper part of the oil pan and on the bottom cover for timing chain with chemical sealant remover.
- Degrease the sealing surfaces.
- Install bottom cover for timing chain with old screws and tighten to 8 Nm.
- Check distance between bottom cover for timing chain and cylinder block with feeler gauge.
 - The distance must not be more than 0.2 mm.

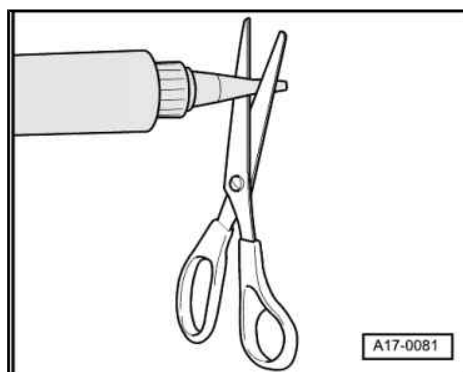
**Note**

- ◆ *If the distance is more than 0.2 mm: Replace bottom cover for timing chain.*
- ◆ *The distance must not be measured between cover and upper part of oil pan. Thus a visual inspection on the even surface of the sealing surface is performed.*

- Check if both dowel sleeves -arrows- for centering the bottom cover for timing chain are present.



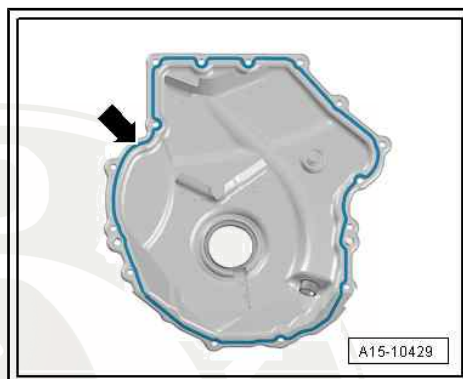
- Cut off nozzle tube at the front marking ($\varnothing$ of nozzle approx. 3 mm).



- Apply silicone sealant -arrow- to the clean sealing surface of the bottom cover for timing chain, as shown in the illustration.
- ♦ Thickness of sealant bead: 2...3 mm

i Note

- ♦ The bottom cover for timing chain must be installed within 5 minutes after applying the silicone sealant.
- ♦ The sealant bead must not be thicker than recommended otherwise excess sealant may get into the oil pan and clog the strainer in the oil suction pipe.



- Fit bottom cover for timing chain immediately and tighten new screws -1 through 15- in 2 stages in the sequence shown:

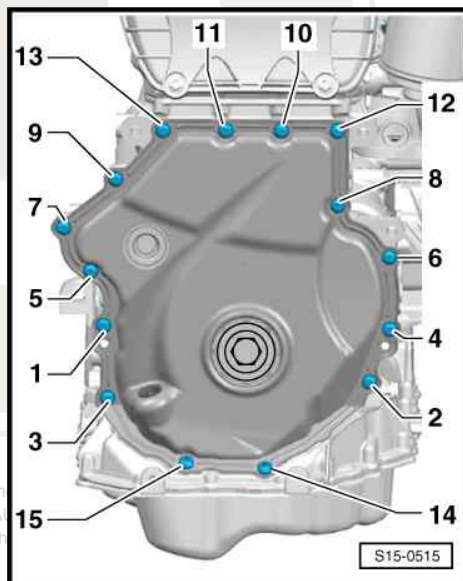
1. Tighten screws to 8 Nm.
2. Torque screws a further 45° (1/8 turn).

i Note

After installing the cover, allow the sealant to dry for about 30 minutes. Only then may engine oil be filled in.

Further installation occurs in reverse order. Pay attention to the following:

- Install tensioning device for V-ribbed belt ⇒ [page 27](#) .
- Adjust the assembly bracket ⇒ [page 22](#) .
- Topping up with engine oil ⇒ Maintenance ; Octavia II .



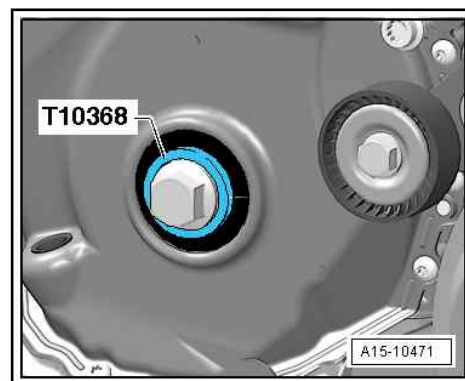
1.4 Replacing vibration damper gasket ring

Special tools and workshop equipment required

- ◆ Thrust piece -T10354-
- ◆ Thrust piece -T10368-
- ◆ Extraction hook -T20143-
- ◆ Cleaning and degreasing agent , e.g. -D 000 401 04-

Removing

- Remove vibration damper ⇒ [page 30](#) .
- Screw in again screw for vibration damper with pressure plate -T10368- .



- Remove gasket ring with ejection hook -T20143- .

Install



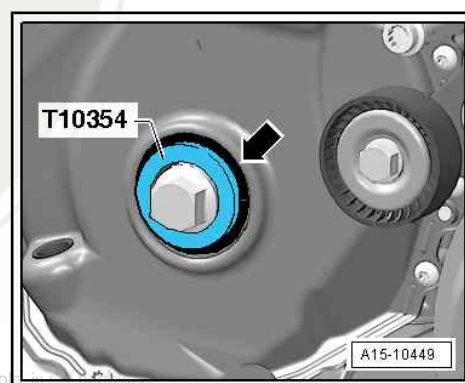
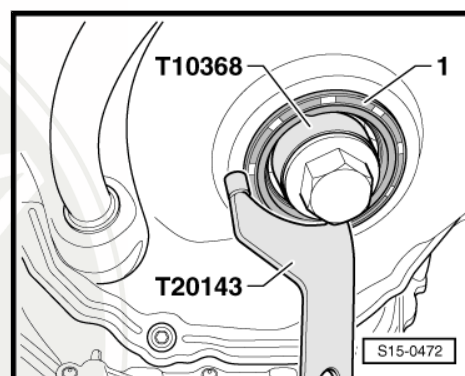
WARNING

Wear protective gloves when working with sealant and grease remover!

- Clean bottom cover for timing chain in the area of the gasket ring seat. It must be free of oil and grease.
- Insert gasket ring -arrow- with pressure plate -T10354- and screw for vibration damper up to the stop.

Further installation occurs in reverse order. Pay attention to the following:

- Install the vibration damper ⇒ [page 30](#) .



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2 Camshaft timing chain

2.1 Camshaft timing chain - Summary of components

1 - 9 Nm

2 - Chain tensioner

- ☐ under spring tension
- ☐ remove with rig pin - T40011- before removal

3 - Tensioning rail

4 - Guide bolt, 20 Nm

5 - 9 Nm

6 - Control valve, 35 Nm

- ☐ Left-hand thread
- ☐ for engine identification character BZB remove with assembly tool - T10352-
- ☐ for engine identification characters CDAA, CDAB, CCZA remove with assembly tool - T10352/1 -

7 - 8 Nm + torque a further 90° (1/4 turn)

- ☐ replace

8 - Washer

9 - Bearing bracket

10 - Sliding rail

11 - Cylinder head cover

12 - Camshaft timing chain

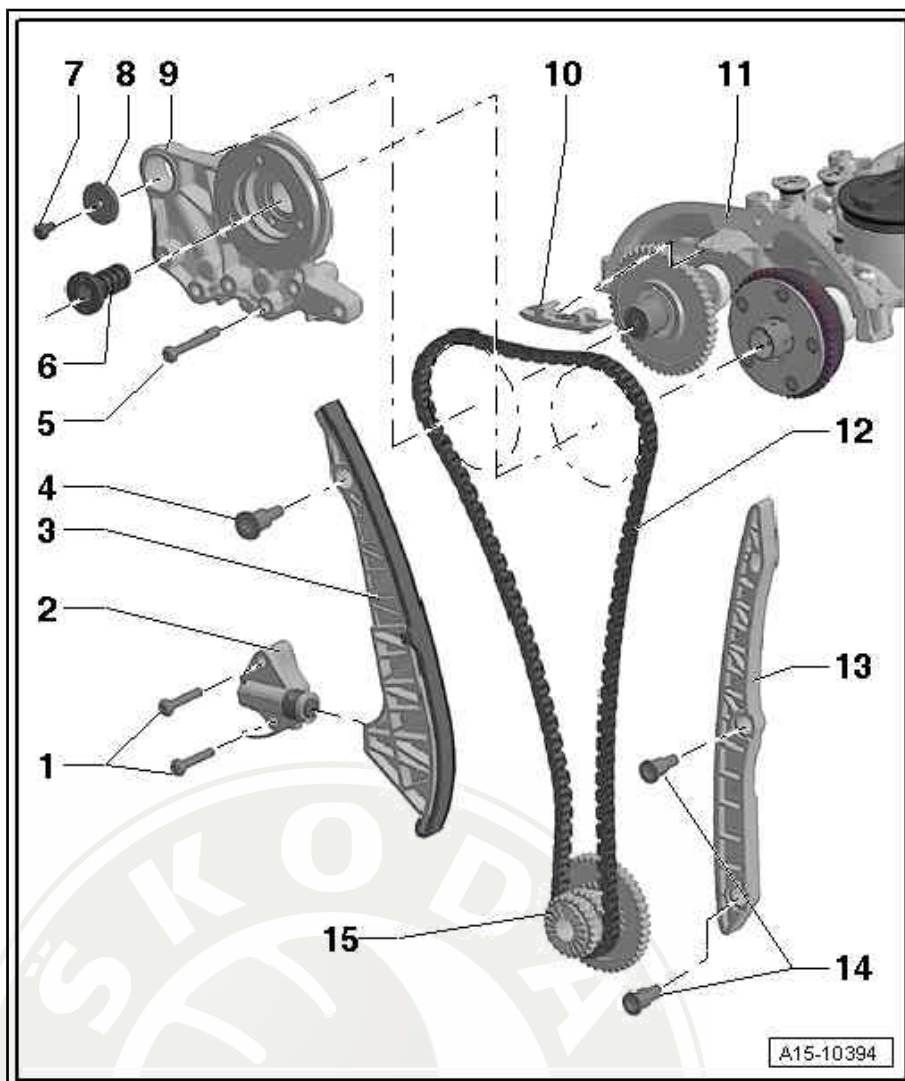
- ☐ mark running direction with colour before removing
- ☐ removing and installing ⇒ [page 55](#)

13 - Sliding rail

14 - Guide bolt, 20 Nm

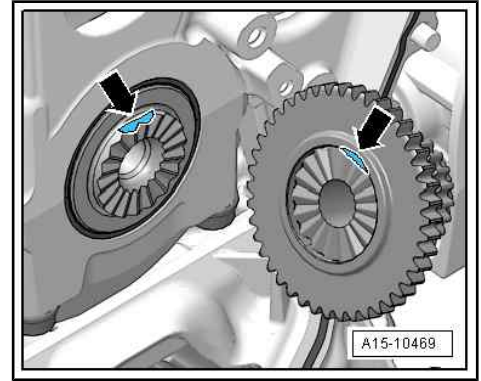
15 - Sprocket

- ☐ for crankshaft
- ☐ Fitting position ⇒ [page 55](#)



chain sprocket to crankshaft - fitting position

- Both surfaces -arrows- must stand opposite to each other.



2.2 Removing and installing camshaft timing chain

Special tools and workshop equipment required

- ◆ Assembly tool -T10352- or assembly tool -T10352/1-
- ◆ Rig pin -T40011-

Removing

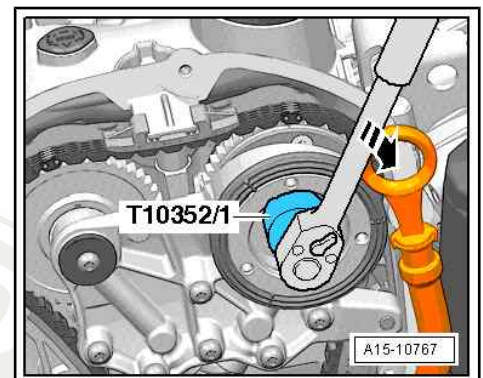
- Remove top cover for timing chain ➔ [page 48](#) .



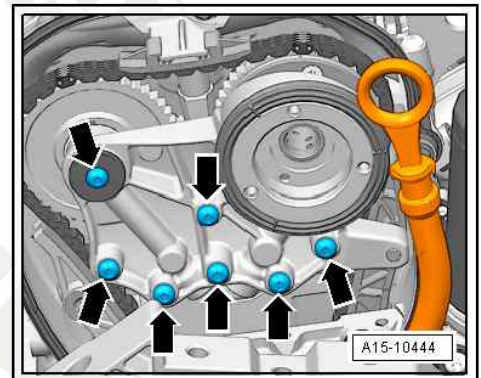
Caution

The control valve has a left-hand thread.

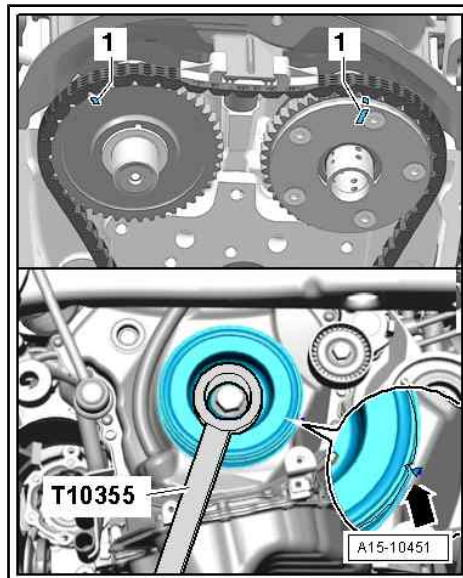
- Remove the control valve in the -direction of the arrow-:
- ◆ for engine identification character BZB with assembly tool - T10352-
- ◆ for engine identification characters CDAA, CDAB, CCZA with assembly tool -T10352/1-



- Release screws -arrows- and remove bearing bracket.



- Turn the vibration damper with the counterholder -T10355- into position "TDC for cylinder 1" -arrow-.
- The notch at the vibration damper must be opposite the arrow marking on bottom cover for timing chain.
- The markings -1- of the camshaft must point upwards.
- Remove bottom cover for timing chain ➔ [page 48](#) .

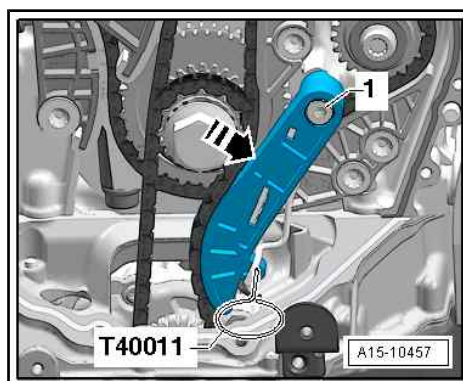


- Press the chain tensioner of the oil pump in -direction of arrow- and lock with rig pin -T40011- .
- Remove chain tensioner of oil pump -1-.
- Remove drive chain for oil pump from chain sprocket at the crankshaft.

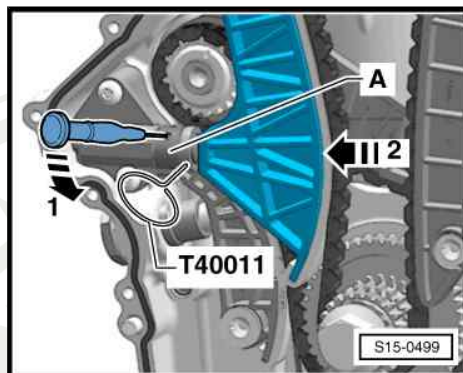


Note

For the following working step a second mechanic is required.



- Use a suitable cross-head screwdriver (approx. 2 mm) to lift the locking wedge of the chain tensioner in -direction of arrow 1-, press the tensioning rail in -direction of arrow 2- and secure the chain tensioner with rig pin -T40011- .



Caution

- ♦ **The lock washer -A- of the chain tensioner must not be bent or levered off!**
- ♦ **If the automatic resetting of the chain tensioner does not function, the timing chain can jump over a tooth at a cold start - risk of engine damage!**

- Remove tensioning rail -2-.



Note

The inlet camshaft jumps in the running direction of the engine.

- Remove sliding rail -1-.
- Remove timing chain.

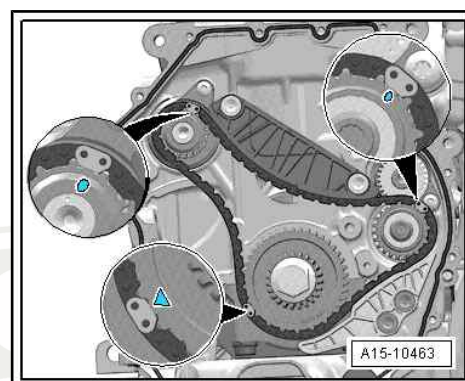
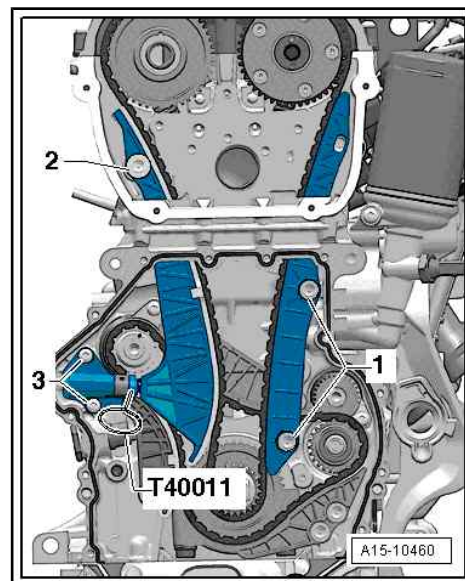
Install



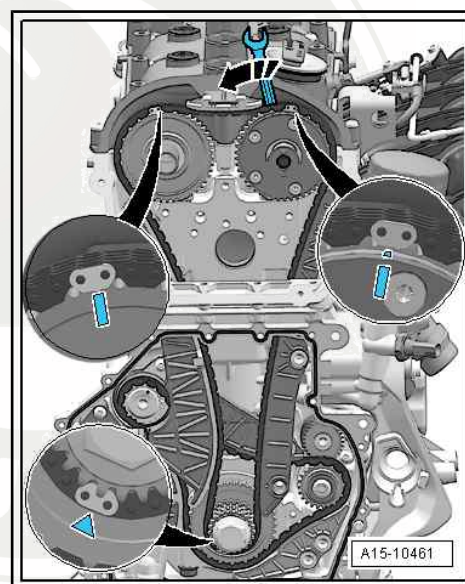
Note

- ◆ *The following work sequence must be performed in one work step, to do so a second mechanic is required.*
- ◆ *The coloured links of the timing chain must be positioned on the markings of the chain sprockets.*
- ◆ *Hold the wrench until the sliding rail and the tensioning rail are installed.*

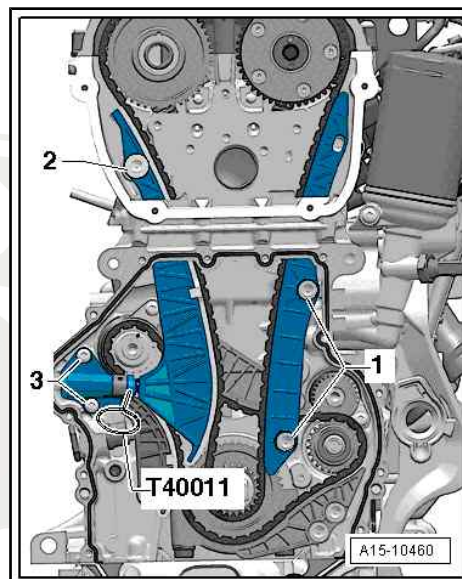
- Check if the crankshaft is on “TDC for cylinder 1”.



- Place timing chain onto outlet camshaft.
- Place timing chain onto crankshaft.
- Turn inlet camshaft with wrench in -direction of arrow- and fit timing chain.



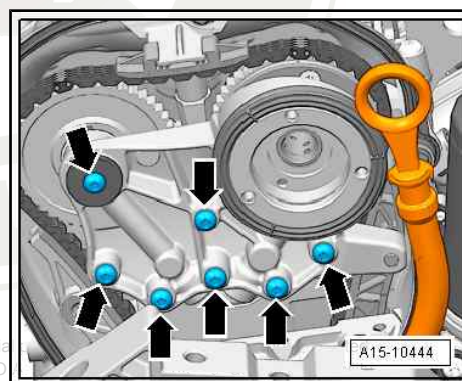
- Install sliding rail and tighten screws -1-.
- Install tensioning rail and tighten screw -2-.



- Fit on bearing bracket and screw in screws -arrows- by hand.
- Remove the locking pin -T40011- .
- Tighten the screws -arrows- of the bearing bracket
⇒ [page 54](#) .
- Install control valve (left-hand thread) ⇒ [page 54](#) .

Further installation occurs in reverse order. Pay attention to the following:

- ◆ Tightening torques: ⇒ [page 54](#)
- Install bottom cover for timing chain ⇒ [page 48](#) .
- Install top cover for timing chain ⇒ [page 48](#) .



3 Balancing shaft timing chain and balancing shafts

3.1 Summary of components

1 - 9 Nm

2 - Balancing shaft

- ☐ replace after removal
- ☐ Outlet side
- ☐ Oil bearing with engine oil
- ☐ removing and installing
⇒ [page 66](#)

3 - Pipe for balancing shaft

- ☐ Fitting position
⇒ [page 60](#)

4 - Chain tensioner, 65 Nm

5 - Cylinder block

6 - Balancing shaft

- ☐ replace after removal
- ☐ Inlet side
- ☐ Oil bearing with engine oil
- ☐ removing and installing
⇒ [page 63](#)

7 - O-ring

- ☐ moisten with engine oil

8 - Bearing bolt

- ☐ moisten with engine oil
- ☐ Fitting position
⇒ [page 60](#)

9 - Intermediate shaft wheel

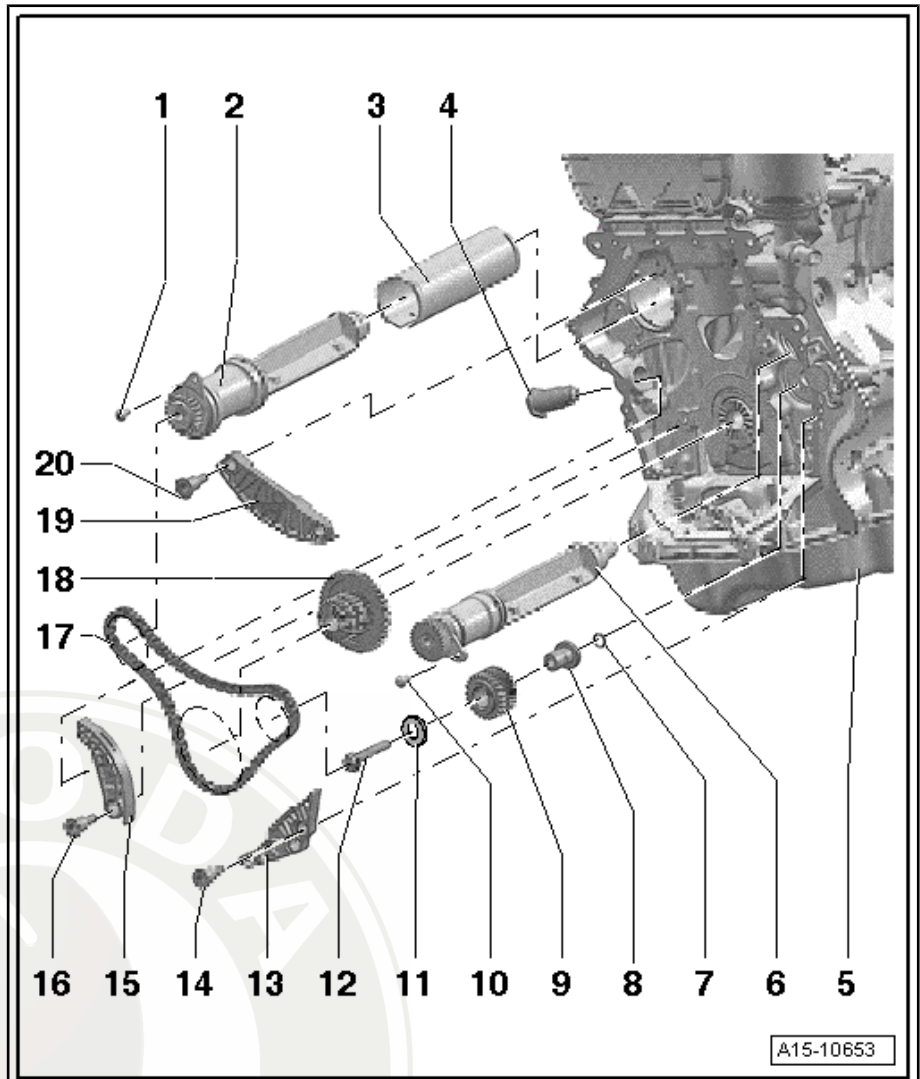
- ☐ for balancing shaft
- ☐ If the screw -pos. 11-
was released, the inter-
mediate shaft wheel must be replaced due to the tooth flange clearance.
- ☐ Fitting position ⇒ [page 61](#)

10 - 9 Nm

11 - Washer

12 - Screw

- ☐ replace
- ☐ If the screw was loosened, the intermediate shaft wheel -Pos. 9- must be replaced.
- ☐ order of tightening ⇒ [page 61](#)



13 - Sliding rail

14 - Guide bolt, 20 Nm

15 - Tensioning rail

16 - Guide bolt, 20 Nm

17 - Balancing shaft timing chain

- ☐ removing and installing ⇒ [page 61](#)

18 - Sprocket

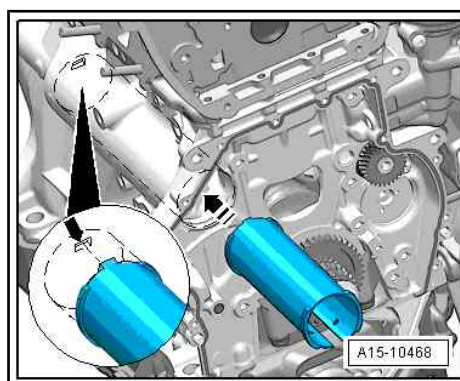
- ☐ at crankshaft
- ☐ Fitting position ⇒ [page 55](#)

19 - Sliding rail

20 - Guide bolt, 20 Nm

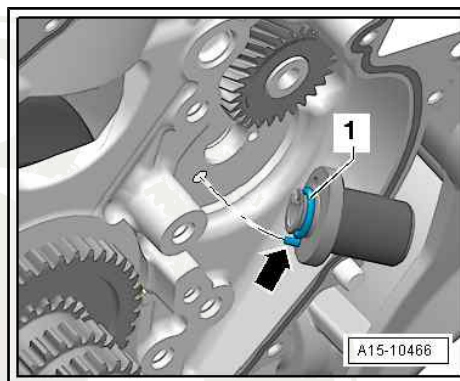
Pipe for balancing shaft - fitting position

- The stud of the pipe for balancing shaft must fit into the groove -arrow-.



Bearing bolt - fitting position

- Replace O-ring -1- and oil.
- The stud dowel pin -arrow- for bearing bolt must engage into the hole of the cylinder block.
- Oil bearing bolt.

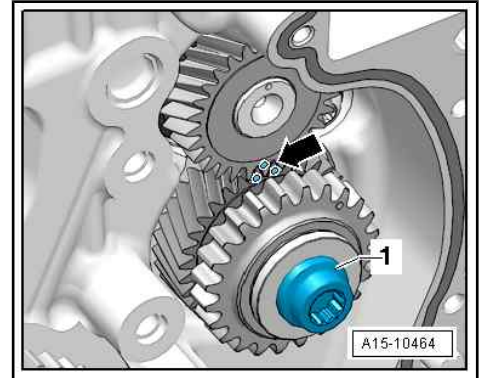


Intermediate shaft wheel for balancing shaft - fitting position and tightening sequence



Caution

- ◆ *The intermediate shaft wheel must be replaced. Otherwise there is no tooth flank clearance - engine damage!*
- ◆ *The new intermediate shaft wheel has a lubricating varnish coating, which wears off after a low mileage and thus the tooth flank clearance is set automatically.*



- The marking on the balancing shaft must be between the markings on the new intermediate shaft wheel -arrow-.
- Tighten the new screw as follows:
 1. Pre-tighten with the torque wrench to 10 Nm.
 2. Turn intermediate shaft wheel.

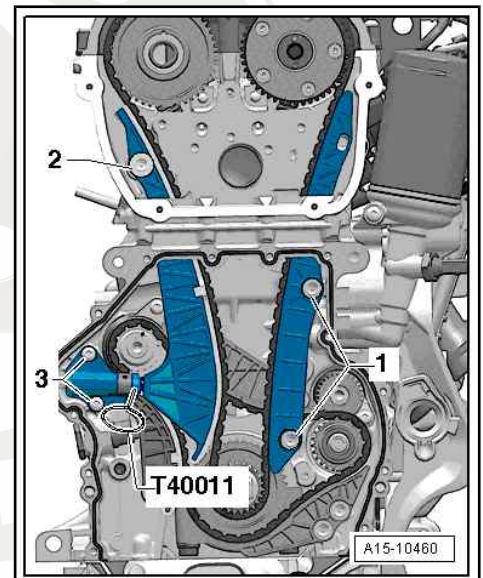
The intermediate shaft wheel must have no play. Otherwise slacken and tighten once again.

 3. Tighten with the torque wrench to 30 Nm.
 4. Tighten further 90° with a rigid wrench.

3.2 Removing and installing balancing shaft timing chain

Removing

- Removing the camshaft timing chain ⇒ [page 55](#).
- Remove chain tensioner for camshaft timing chain -3-.



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- Remove chain tensioner for balancing timing chain -1-.
- Remove tensioning rail -2-.
- Remove sliding rail -3-.
- Remove sliding rail -4-.
- Remove balancing shaft timing chain.

Install

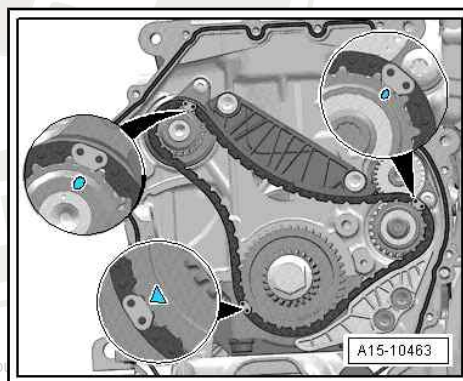
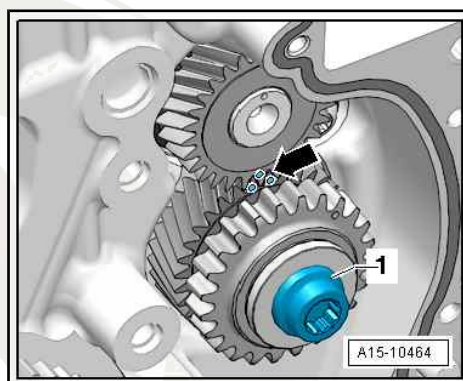
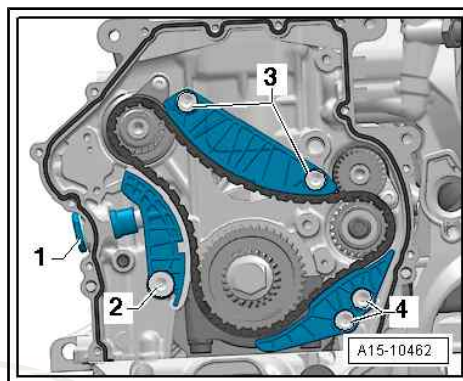
- Turn intermediate shaft wheel/balancing shaft in such a way that the marking on the balancing shaft is between the markings on the intermediate shaft wheel -arrow-.



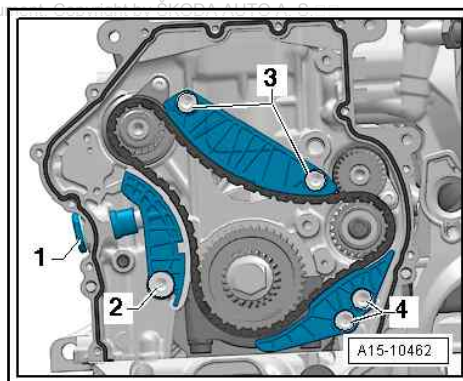
Note

Depending on the transmission ratio, the markings cover each other only every 7th revolution.

- Position the balancing shaft timing chain in such a way that the coloured links of the timing chain correspond with the markings on the chain sprockets.



- Install sliding rail and tighten screws -4-.
- Install sliding rail and tighten screws -3-.
- Install tensioning rail and tighten screw -2-.
- Install chain tensioner -1-.

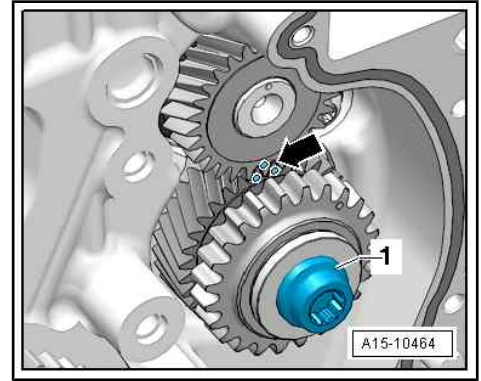


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- Check the position of the intermediate shaft wheel/balancing shaft -arrow-.

Note

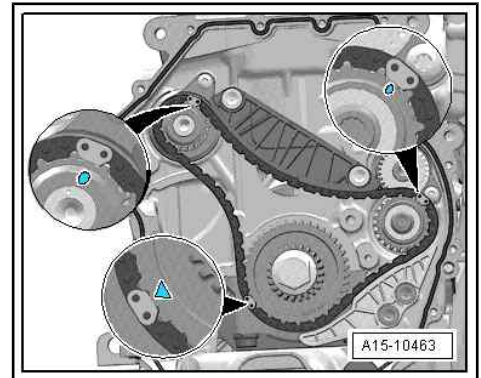
To provide a clearer illustration, the marking of the intermediate shaft wheel/balancing shaft -arrow- is shown with the balancing shaft timing chain removed.



- Once again check the position of the balancing shaft timing chain.

Further installation occurs in reverse order. Pay attention to the following:

- ◆ Tightening torques: ➔ [page 59](#)
- Install camshaft timing chain ➔ [page 55](#) .



3.3 Removing and installing balancing shaft for inlet camshaft

Special tools and workshop equipment required

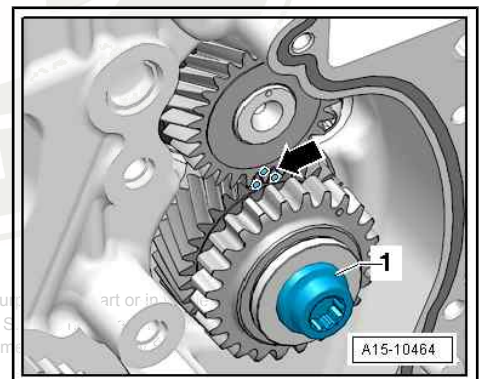
- ◆ Extractor -T10394-
- ◆ Extractor -T10055-

Note

Always replace the balancing shaft after removal.

Removing

- Remove toothed belt of coolant pump ➔ [page 126](#) .
- Removing the balancing shaft timing chain ➔ [page 61](#) .
- Remove the intermediate shaft wheel -1-.

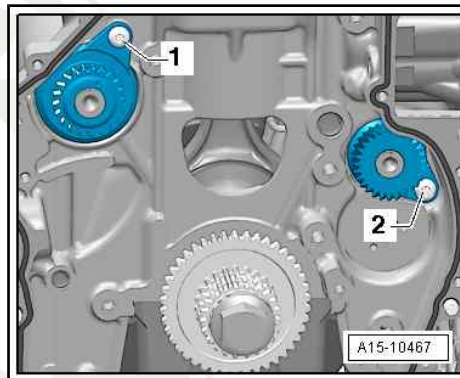


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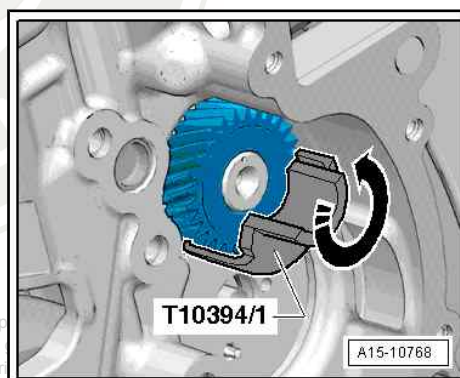


- Remove balancing shaft for inlet camshaft -2-.

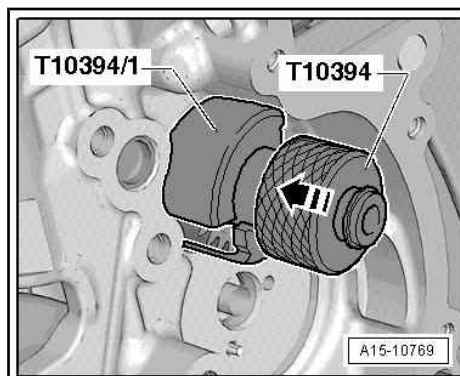
If the balancing shaft cannot be pulled out by hand, use the extractor -T10394- :



- Position the device -T10394/1- for the extractor -T10394- and turn it upwards in -direction of arrow-.



- Position the extractor -T10394- and push the sliding sleeve in -direction of arrow-.



- Screw the extractor -T10055- into the extractor -T10394- and knock out the balancing shaft in -direction of arrow-.

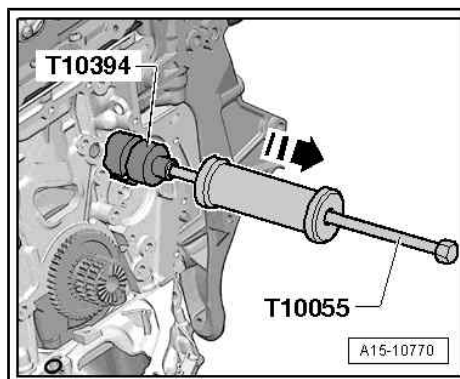
Installing



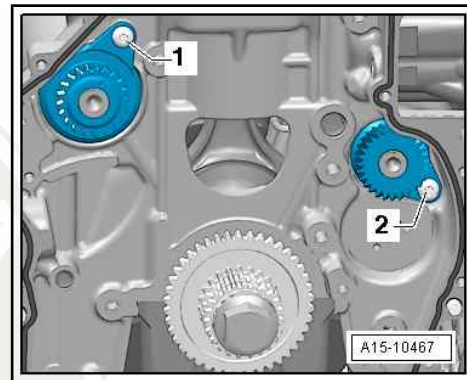
Note

Due to the minimum clearance between the balancing shaft and the cylinder block, it may be necessary to install a cooled balancing shaft! Check if it is possible to insert the balancing shaft into the cylinder block without using force. If this is not the case, it is necessary to let the balancing shaft cool down before installing.

- ♦ Tightening torques: ➔ [page 59](#)
- Put a new balancing shaft into a freezer for about 30 minutes or spray with a commercially available cooling spray.
- Oil bearing of balancing shaft with engine oil.



- Install balancing shaft for inlet camshaft and tighten the screw -2-.

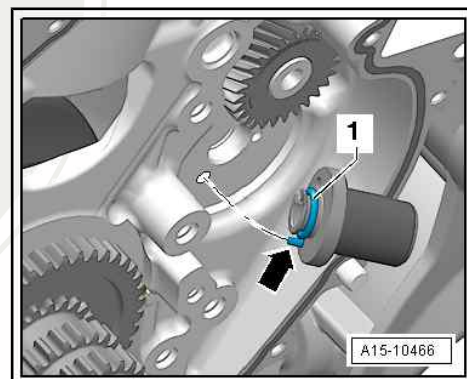


- Replace O-ring -1- and oil with engine oil.
- Oil bearing bolt with engine oil and insert. The dowel pin -arrow- must engage into the hole in the cylinder block.

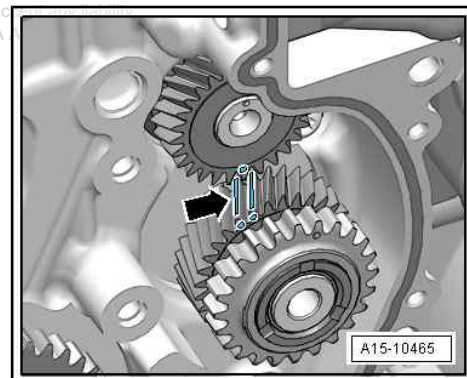


Caution

- ◆ *The intermediate shaft wheel must be replaced. Otherwise there is no tooth flank clearance - engine damage!*
- ◆ *The new intermediate shaft wheel has a lubricating varnish coating, which wears off after a low mileage and thus the tooth flank clearance is set automatically.*



- Mark the tooth flanks of the new intermediate shaft wheel with colour -arrows-.
- Insert intermediate shaft wheel.



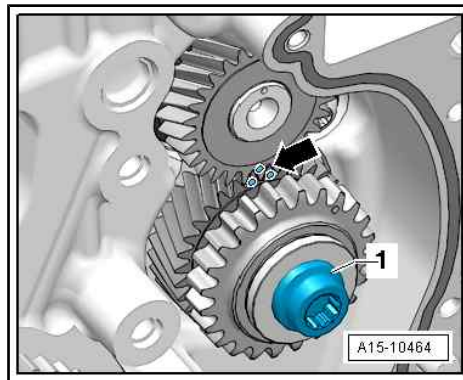


- The marking on the balancing shaft must be between the markings on the intermediate shaft wheel -arrow-.
- Tighten new screw -1- for intermediate shaft wheel.
Tightening torque and tightening order: ➔ [page 61](#)
- Check markings of the intermediate shaft wheel/balancing shaft -arrow-.



Note

Depending on the transmission ratio, the markings cover each other only every 7th revolution.



Further installation occurs in reverse order. Pay attention to the following:

- Install balancing shaft timing chain ➔ [page 61](#) .
- Replace gasket ring for coolant pump drive ➔ [page 128](#) .
- Install toothed belt of coolant pump ➔ [page 126](#) .

3.4 Removing and installing balancing shaft for outlet camshaft

Special tools and workshop equipment required

- ◆ Extractor -T10394-
- ◆ Extractor -T10055-



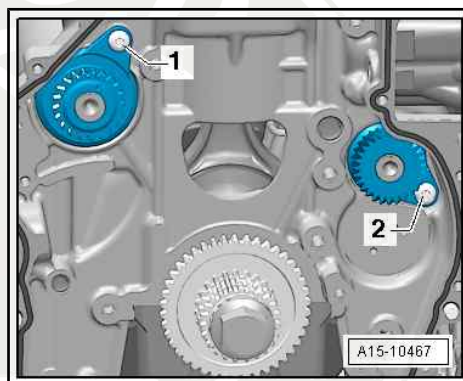
Note

Always replace the balancing shaft after removal.

Removing

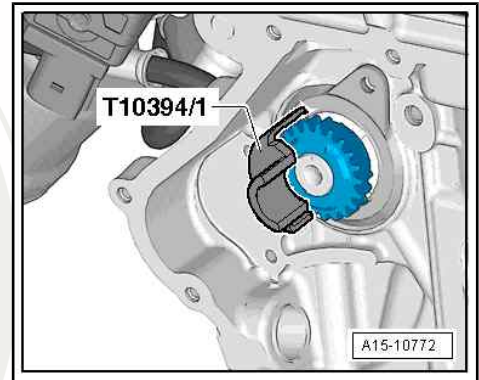
- Removing the balancing shaft timing chain ➔ [page 61](#) .
- Remove balancing shaft for outlet camshaft -1-.

If the balancing shaft cannot be pulled out by hand, use the extractor -T10394- :

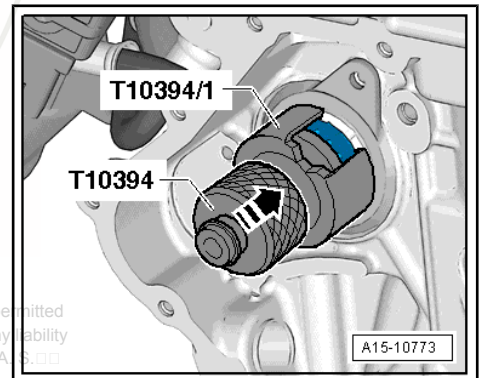




- Position the device -T10394/1 - for the extractor -T10394- .



- Position the extractor -T10394- and push the sliding sleeve in -direction of arrow-.



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- Screw the extractor -T10055- into the extractor -T10394- and knock out the balancing shaft in -direction of arrow-.

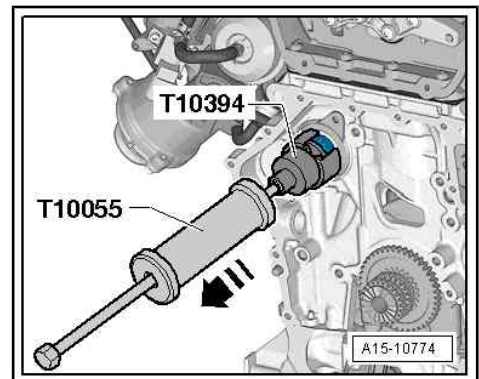
Installing

Note

Due to the minimum clearance between the balancing shaft and the cylinder block, it may be necessary to install a cooled balancing shaft! Check if it is possible to insert the balancing shaft into the cylinder block without using force. If this is not the case, it is necessary to let the balancing shaft cool down before installing.

- ◆ Tightening torques: ➔ [page 59](#)

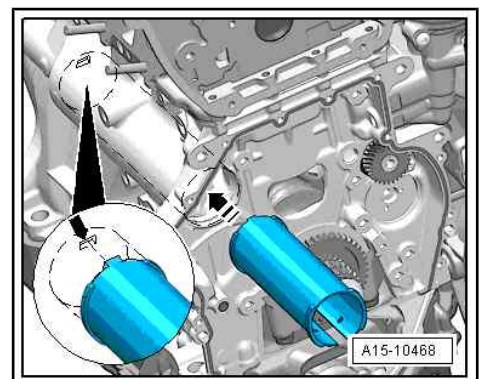
- Check fitting position of balancing shaft pipe -arrow-.
- The stud -arrow- must latch into the groove.



Note

In order to put the pipe into the assembly position, it must be slightly pressed together. Press the pipe into the crankcase and bend both halves once to the inside.

- Put a new balancing shaft into a freezer for about 30 minutes or spray with a commercially available cooling spray.
- Oil bearing of balancing shaft with engine oil.
- Install balancing shaft for outlet camshaft.





- Before tightening the screw -1-, check if the balancing shaft rests flat against the cylinder block.

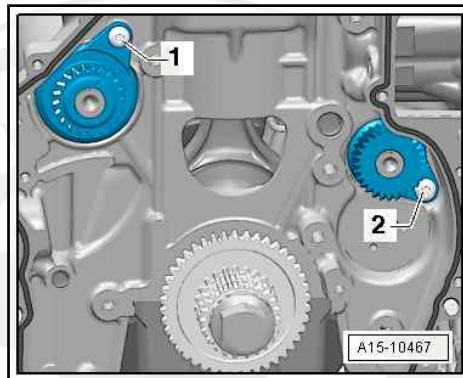


Note

If the balancing shaft does not rest flat, the pipe for the balancing shaft must be inserted again.

Further installation occurs in reverse order. However, pay attention to the following:

- ♦ Tightening torques: ➔ [page 59](#)
- Install balancing shaft timing chain ➔ [page 61](#) .



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4 Cylinder head

4.1 Cylinder head - summary of components



Note

- ◆ If a replacement cylinder head is installed, it is necessary to oil all the contact surfaces between supporting elements, roller rocker arms and cam tracks of the camshaft before installing the cylinder head cover.
- ◆ Do not remove the plastic bases supplied as a protection for the open valves until just before fitting on the cylinder head.
- ◆ Replace cylinder head bolts.
- ◆ When undertaking assembly work replace self-locking nuts, screws which have been tightened to a torquing angle as well as gasket rings and gaskets.
- ◆ If the cylinder head is replaced, the system must also be completely filled with fresh coolant.

1 - Cylinder head gasket

- ☐ replace
- ☐ Observe fitting position:
The part number points to the cylinder head.

2 - Screw

- ☐ Tightening torque and tightening order
⇒ [page 71](#)

3 - Cylinder head

- ☐ removing and installing
⇒ [page 71](#)
- ☐ check for distortion
⇒ [page 71](#)

4 - Cylinder head bolt

- ☐ replace
- ☐ pay attention to order for slackening ⇒ [page 71](#)
- ☐ pay attention to order for tightening ⇒ [page 71](#)

5 - O-ring

- ☐ replace
- ☐ moisten with engine oil

6 - Screw plug, 5 Nm

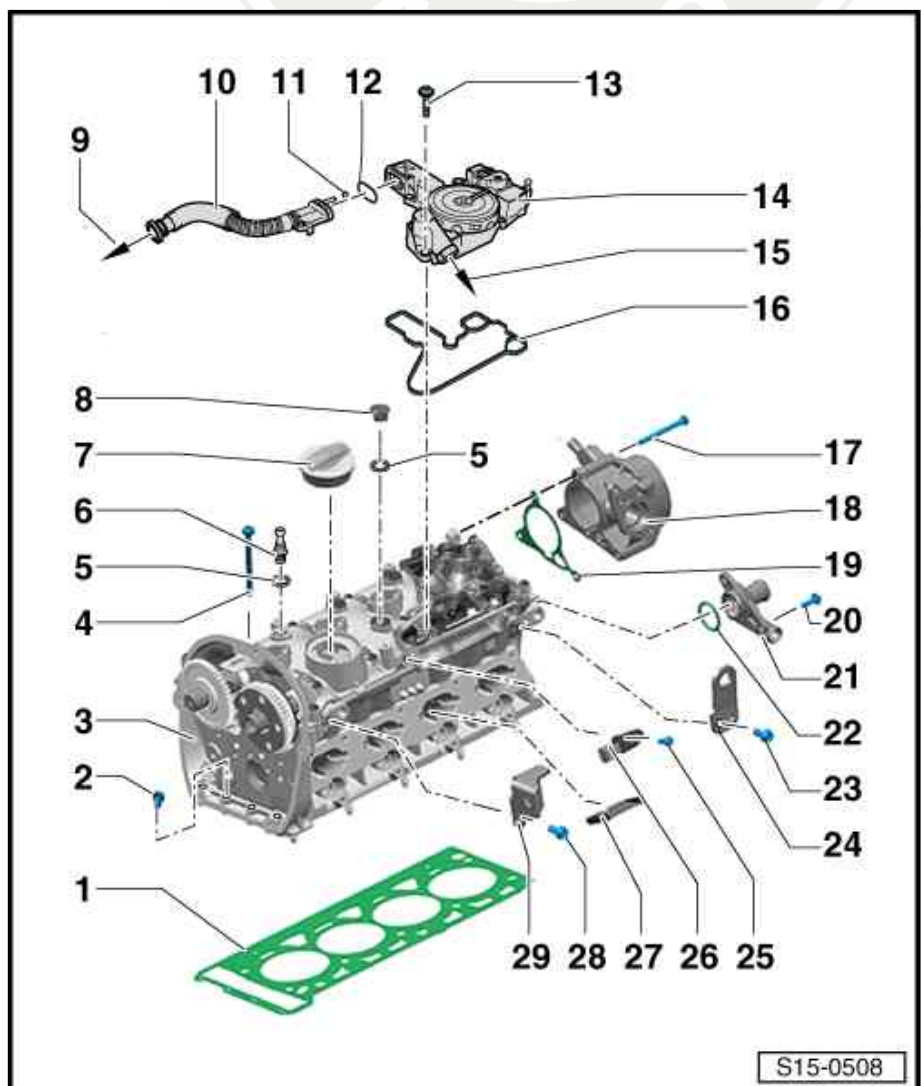
- ☐ with ball head for engine cover

7 - Screw cap

- ☐ with gasket

8 - Plug

9 - to induction pipe/exhaust



S15-0508



turbocharger

10 - Ventilation tube

11 - O-ring

- ☐ no spare part

12 - Sealing ring

- ☐ no spare part

13 - 11 Nm

- ☐ tightening torque for crankcase ventilation ⇒ [page 71](#)

14 - Crankcase ventilation

15 - To intake manifold

16 - Sealing ring

- ☐ no spare part

17 - 9 Nm

18 - Vacuum pump

- ☐ removing and installing ⇒ [page 84](#)
- ☐ Do not disassemble vacuum pump

19 - Sealing ring

- ☐ replace

20 - 9 Nm

21 - Connection fittings

22 - O-ring

- ☐ replace
- ☐ moisten with coolant

23 - 25 Nm

24 - Left lifting eye

25 - 9 Nm

26 - Hall sender -G40-

27 - Separation plate

28 - 25 Nm

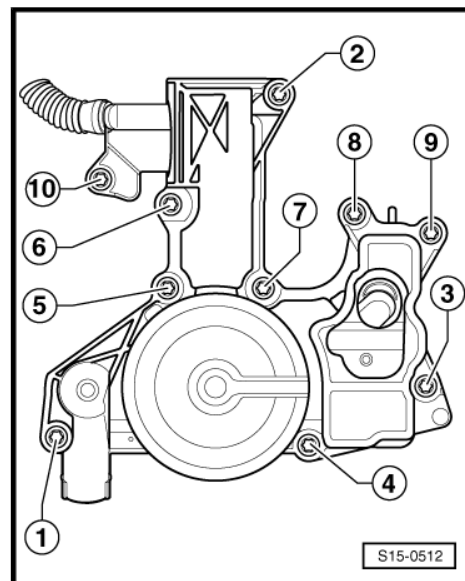
29 - Right lifting eye



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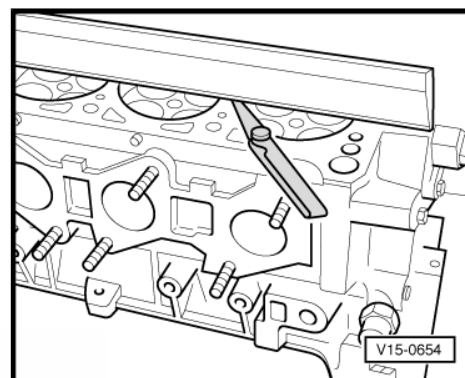
Crankcase ventilation - tightening order

- Tighten the bolts in the sequence -1...10- to 11 Nm.



Inspecting the cylinder head for distortion

- Inspect cylinder head at several points for distortion using a knife-edge straightedge and feeler gauge.
- ◆ max. permissible distortion: 0.05 mm



4.2 Removing and installing cylinder head

Special tools and workshop equipment required

- ◆ Assembly tool -T10352- or assembly tool -T10352/1-
- ◆ Counterholder -T10355 -
- ◆ Rig pin -T40011-
- ◆ Support -T10014-
- ◆ Socket insert -T10070-
- ◆ Lifting device -MP 9-201 (2024A)-
- ◆ Workshop crane , e.g. VAS 6100
- ◆ Sealant remover gasket stripper (bearing code GST, part number R 34402), manufacturer Retech s.r.o.

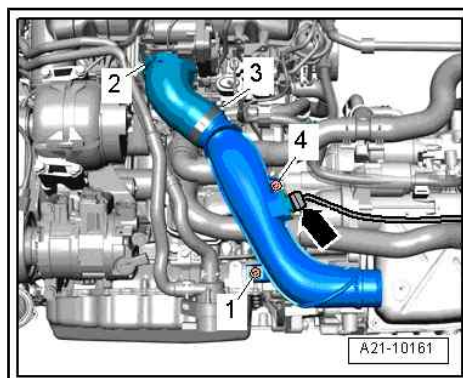
Removing

- The engine must be not more than warm to touch, otherwise the cylinder can get distorted when installing.
- Release pressure in the high pressure area of the fuel system
⇒ [page 4](#) .

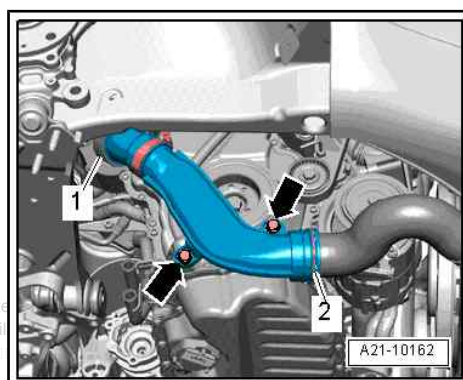
Observe all safety measures and notes for assembly work on the fuel, injection and ignition system as well as the rules for cleanliness ⇒ [page 3](#) .

- Remove the air filter housing ⇒ [page 218](#) .
- Remove pre-exhaust pipe ⇒ [page 237](#) .

- Drain coolant ➔ [page 114](#) .
- Remove the front right wheelhouse liner ➔ Body Work; Rep. Gr. 66 .
- Loosen clamp -2-.
- Disconnect plug -arrow- from charge pressure sender -G31- .
- Unscrew screws -1- and -4- and remove the charge air pipe with the hose to the bottom.

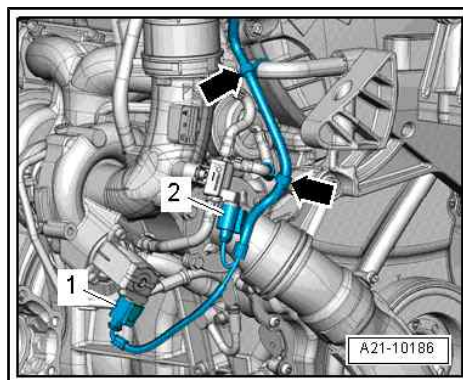


- Screw out screws -arrows-.
- Remove charge-air pipe, to do so lift retaining clips -1 and 2-.



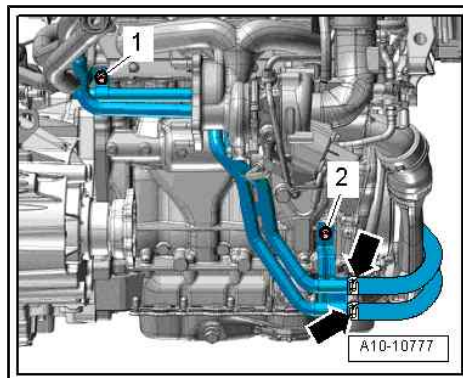
- Disconnect plug connections -1 and 2- and expose electrical cable -arrows-.

Vehicles with auxiliary heating.



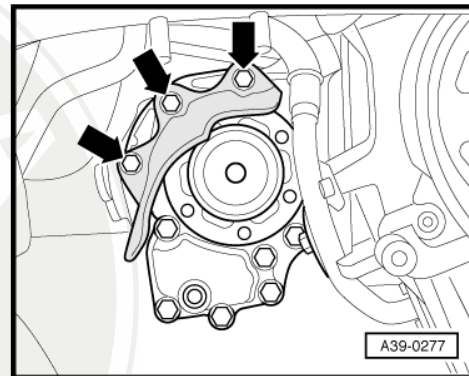
- Release screws -1 and 2- and swivel coolant pipes to the left.

Vehicles with four-wheel drive

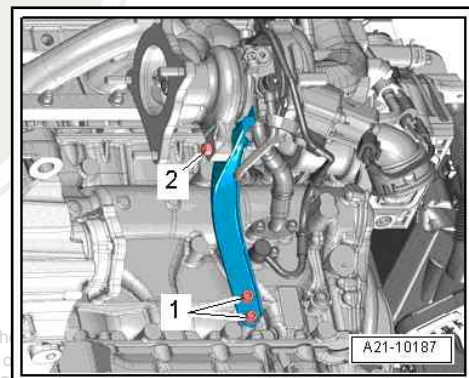


- Remove screws of cap for drive shaft.

Continued for all vehicles



- Release screws -1 and 2- and remove support for turbocharger.



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- Release the hollow screw -2- and lay the coolant line to the side.

Vehicles with front-wheel-drive

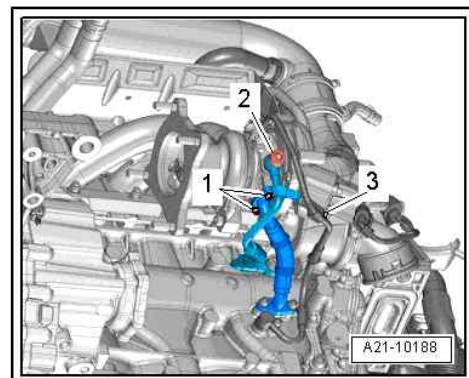
- Release screws -1- to the oil return-flow line.

Vehicles with four-wheel drive

- Release screws of oil return line at cylinder block.

Continued for all vehicles

- Release screw -3- to the oil feed line.



Note

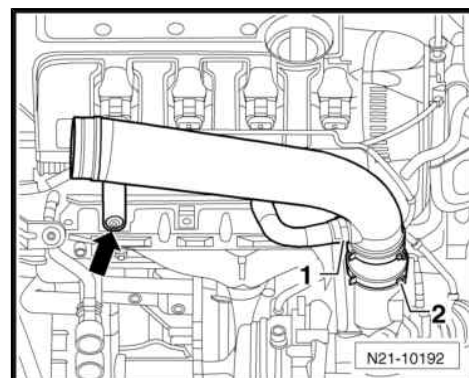
To provide a clearer illustration, the fitting position is shown with the engine removed.

- Pull off ventilation tube -1- for crankcase ventilation.
- Release screw -arrow-.
- Remove intake manifold, to do slacken hose clamp -2-.

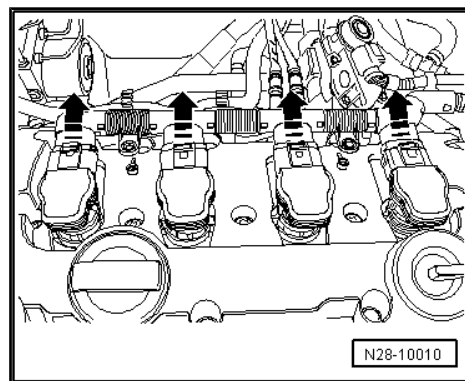


Note

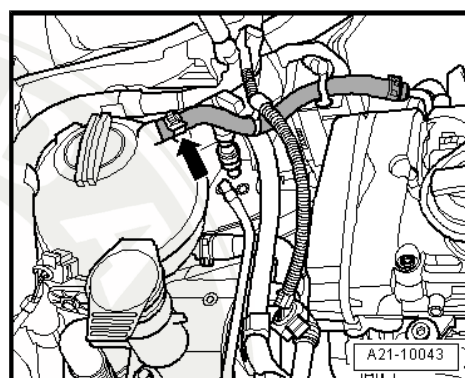
Seal inlet connection at turbocharger.



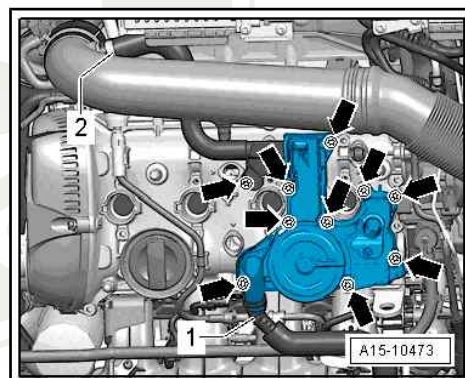
- Disconnect the plug from the ignition coils and place the wiring harness to the side.
- Remove all the ignition coils ➔ [page 241](#) .



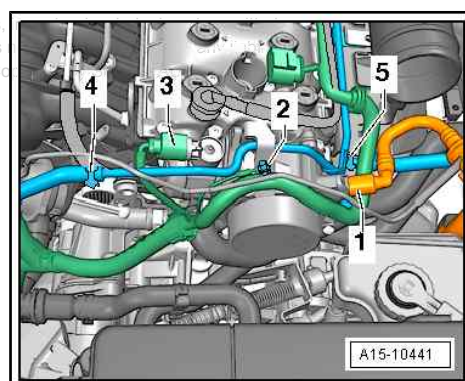
- Disconnect the coolant line to the coolant expansion reservoir -arrow-.



- Separate the hose for crankcase ventilation -1-.
- Release screws -arrows- and remove crankcase ventilation.

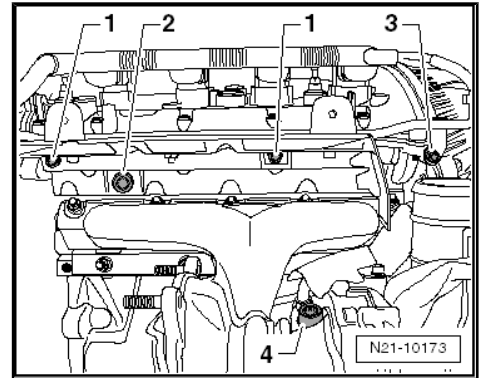


- Separate the vacuum hose from the exhaust turbocharger at the connection point below the position -1-.
- Remove vacuum hose -1- from the vacuum pump and expose.
- Unbolt earth strap -2-.
- Expose the wiring loom of the connector -3-.
- Remove coolant hoses -4 and 5-.
- Laterally detach coolant hose from connection at cylinder head.

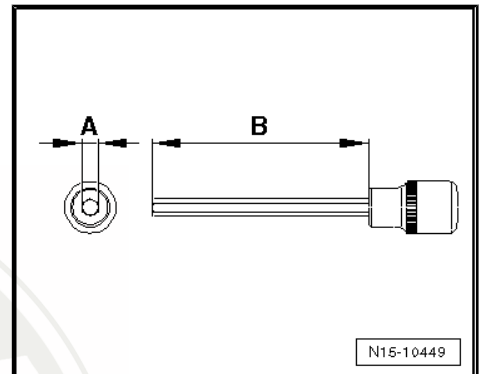




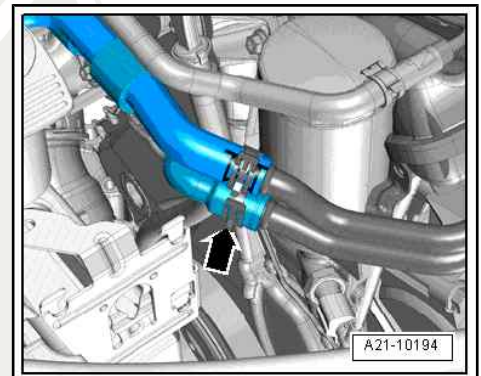
- Release screws -1 to 3- (20 Nm), screw -4- for oil feed line to turbocharger and remove the heat shield together with the coolant pipe.

**Note**

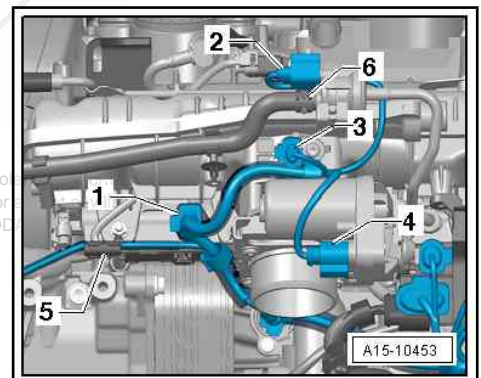
On 2.0 ltr. engines, release the screw -2- from the heat shield using an adapter with a hexagon of 6 mm -A-. The shape of the hexagon must be at least 5 cm long -B-. The adapter, which narrows at the tip to 6 mm, is too thick.



- Separate coolant hose -arrow- and expose.

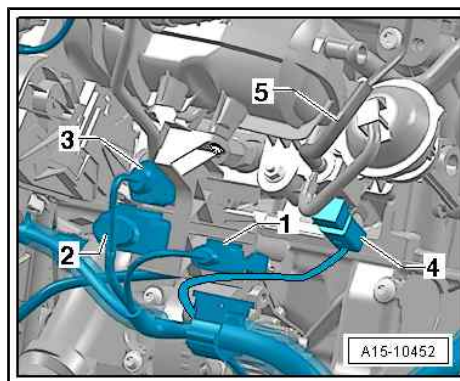


- Unplug connector -1...4-.
- Expose cable -5-.
- Detach vacuum line -6- to activated charcoal filter system.

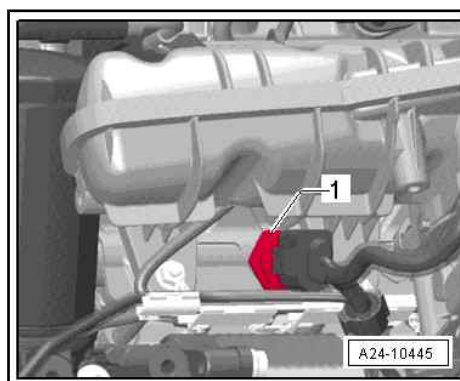


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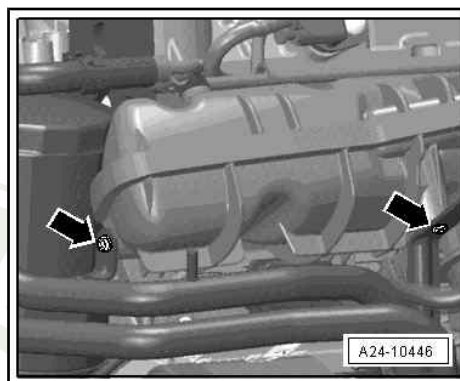
- Disconnect the plug connection -1- and pull the plug out of the fixture.
- Separate plug connections -2...4-.
- Detach vacuum line -5-.



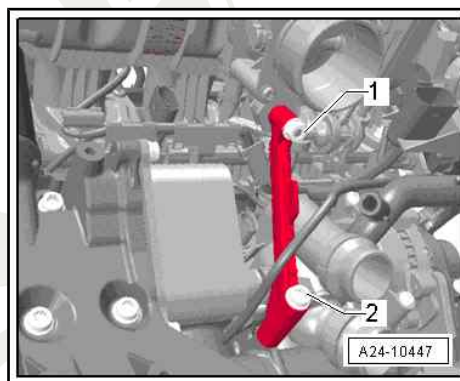
- Disconnect plug from fuel pressure sender -G247- -1-.



- Unscrew the screws -arrows- of the coolant line at intake manifold.



- Release nut -1-, release screw -2- and remove intake manifold support.



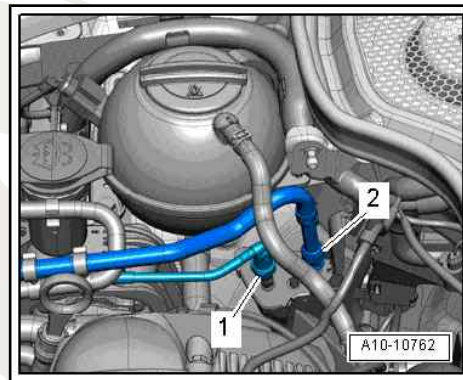


- Remove the fuel feed line -2- (press in the securing ring to the top) and catch the fuel which flows out with a cleaning cloth.
- Remove top cover for timing chain ⇒ [page 48](#) .

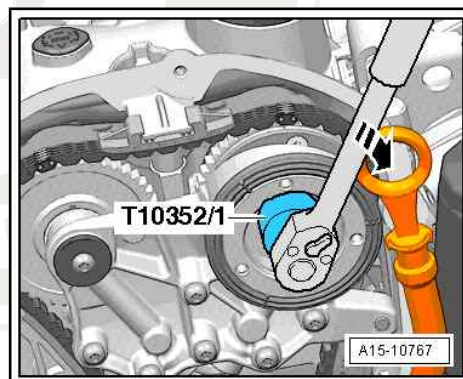


Caution

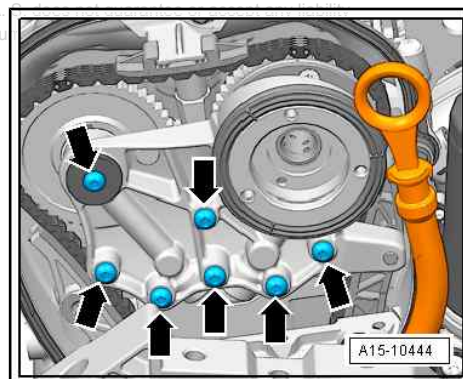
The control valve has a left-hand thread.



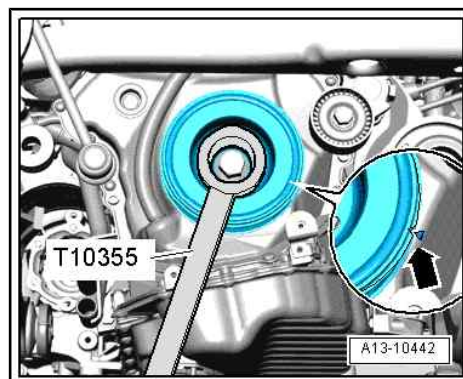
- Remove the control valve in the -direction of the arrow-:
- ◆ for engine identification character BZB with assembly tool - T10352-
- ◆ for engine identification characters CDAA, CDAB, CCZA with assembly tool -T10352/1-



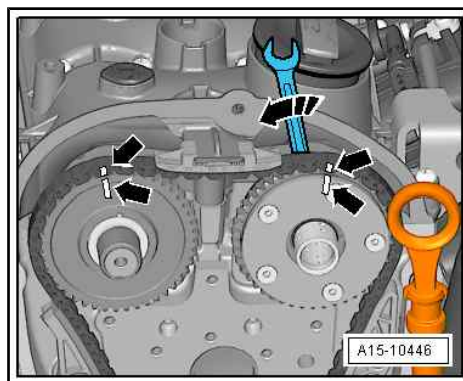
- Release screws -arrows- and remove bearing bracket.



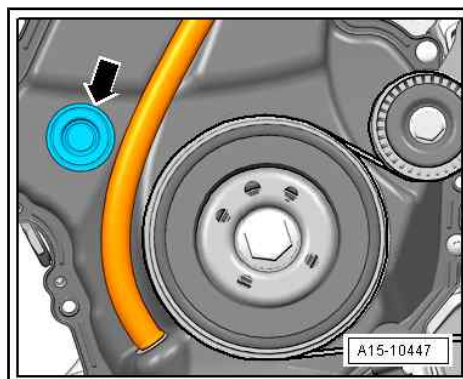
- Turn the vibration damper with the counterholder -T10355- into position "TDC for cylinder 1" -arrow-.
- The notch at the vibration damper must be opposite the arrow marking on bottom cover for timing chain.



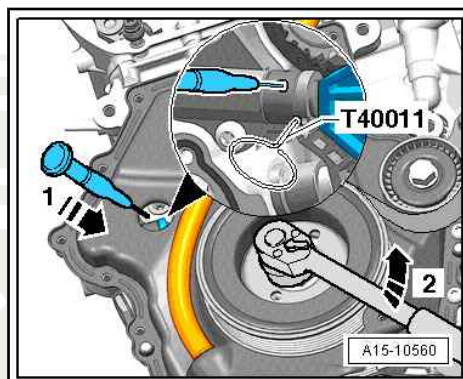
- Mark position of camshaft timing chain/chain sprockets -arrows- with an indelible pen.



- Remove plug -arrow-.



- Lift the locking wedge of the chain tensioner. For this step, insert a scriber or a suitable screwdriver into the hole of the chain tensioner -direction of arrow 1-.
- Turn the crankshaft in opposite direction of rotation of engine -direction of arrow 2- while the locking wedge is raised and secure the chain tensioner with the rig pin -T40011 - .
- Turn the crankshaft back to "TDC for cylinder 1".





- Screw out screw -1- and guide tensioning rail -2- downwards.



Note

The inlet camshaft jumps in the running direction of the engine.

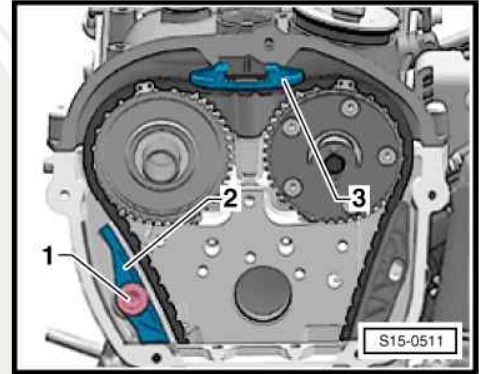
- Remove upper sliding rail -3-. To do so release the catch with a screwdriver and press the sliding rail off the cylinder head cover.



Note

On an installed bottom cover for timing chain, the slackened chain "can" "not" skip the crankshaft.

- Remove camshaft timing chain from the chain sprockets and place downwards.



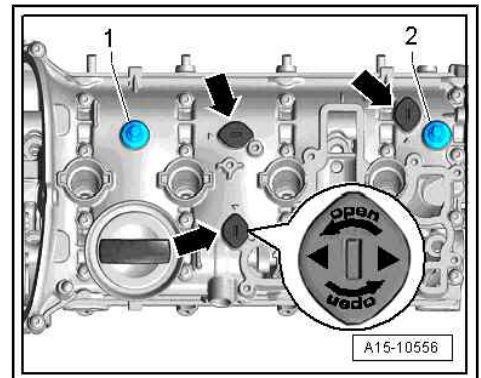
Caution

Risk of damage to the valve drive and the bottom cover for the timing chain!

♦ *If the camshaft timing chain was removed from the chain sprockets, the crankshaft must no longer be turned.*

♦ *Panels are attached to the bottom cover for timing chain, which prevent the chain from slipping off. If the crankshaft is turned while the chain is slackened, the panels may bend.*

- Turn plug -arrows- anticlockwise through 90 degrees and take out.
- Release plug -1 and 2-
- Take off cap.

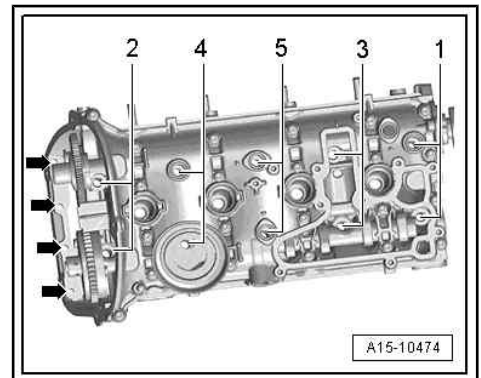


- Screw out screws -arrows-.
- Slacken all cylinder head bolts in the order shown. Unscrew cylinder head bolts up to 2 pieces.

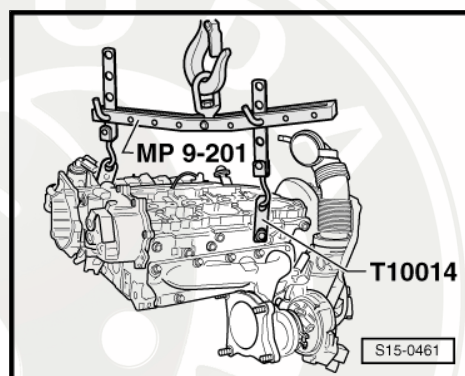
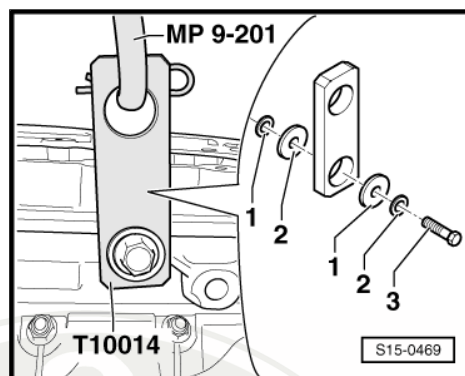


Note

- ♦ *To secure the cylinder head these 2 screws must remain screwed in.*
- ♦ *In order to be able to release the cylinder head bolts, turn the inlet camshaft with the wrench.*
- ♦ *Check whether all hose and line connections to engine, gear-box and body are released.*



- Install the holder -T10014- with 2 small and large washers each on the cylinder head, as shown in the fig.
- 1 - M8 washer, small
- 2 - M8 washer, large The outside diameter of the washer must be larger than the hole in the holder .
- 3 - Screw M8 x 30
- Hang the lifting device - MP 9-201- in the holder -T10014- and in the front left lifting eye at the cylinder head.
- Hook the lifting device - MP 9-201- in the workshop crane and slightly raise the cylinder head.
- Unscrew the last two cylinder head screws.



Caution

- ◆ *Carefully lift the cylinder head upwards until the sliding rail of the camshaft timing chain is free.*
- ◆ *The tensioning and sliding rail must on no account be damaged.*

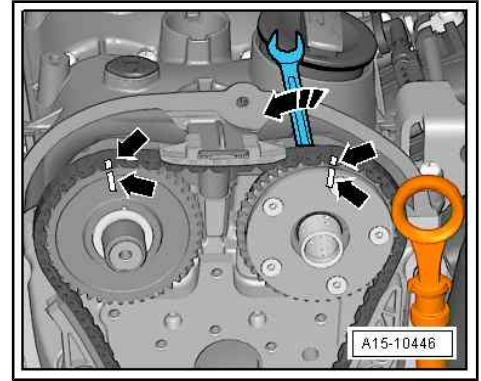
Install

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Note

- ◆ Replace cylinder head bolts.
 - ◆ When performing installation work replace the self-locking nuts.
 - ◆ Replace screws which have been tightened to a torquing angle as well as gasket rings and seals.
 - ◆ If an exchange cylinder head is installed, the camshafts must be positioned on "TDC for cylinder 1" and the marking on the old chain sprockets -arrows- must be transposed to the new chain sprockets (pay attention to factory colour coding on the chain sprockets).
 - ◆ If a replacement cylinder head is installed, it is necessary to oil all the contact surfaces between supporting elements, roller rocker arms and cam tracks of the camshaft before installing the cylinder head cover.
 - ◆ Remove the new cylinder head gasket from its wrapping immediately before fitting.
 - ◆ Treat the new cylinder head seal with the utmost care. Damage to the silicone layer and in the area of the bead results in leakages.
 - ◆ There must not be any oil or coolant present in the holes for the cylinder head bolts.
- Make sure that when cleaning the cylinder head and cylinder block no foreign bodies can get into the cylinder or into the oil and coolant galleries.



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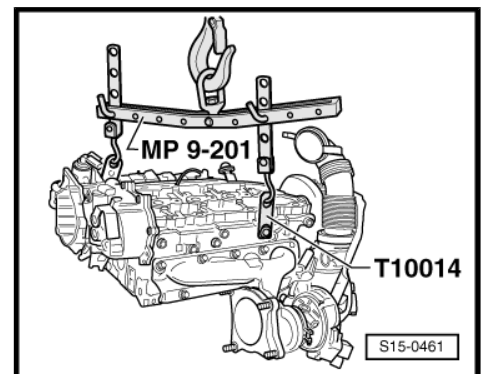
Wear protective gloves when working with sealant and grease remover!

- When conducting repairs sealant residues should be removed from the contact surface of the cylinder head/cylinder block using a chemical cleaner.
- Position the new cylinder heads. The legend (part number) must be legible on the inlet side.
- Hang the cylinder head on the workshop crane and position it above the cylinder block.



Caution

- ◆ Carefully lower the cylinder head.
- ◆ The tensioning and sliding rail must on no account be damaged.



- Pay attention to centring pins in cylinder block -arrows-.
- Insert the cylinder head bolts and tighten by hand.



Note

In order to be able to screw in the cylinder head bolts, turn the inlet camshaft with the wrench.

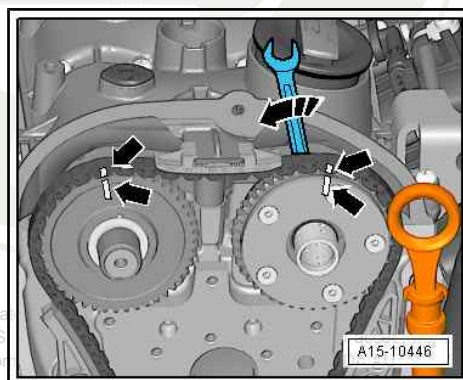
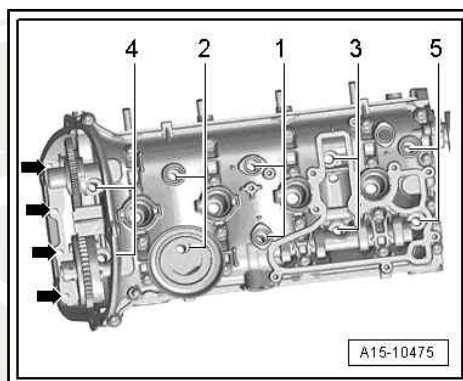
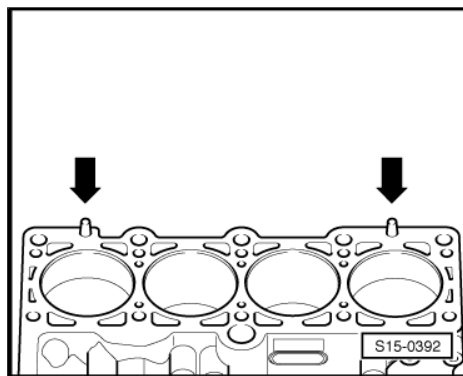
- Dismantle the lifting device -MP 9-201- .
1. Pre-tighten with the torque wrench to 40 Nm.
 2. Tighten further 90° with a rigid wrench.
 3. Tighten further 90° with a rigid wrench.
 4. Tighten screws -arrows- to 8 Nm.
 5. Tighten screws -arrows- further 90° with a rigid wrench.



Note

The following work sequence must be performed in one work step, to do so a second mechanic is required.

- Turn inlet camshaft with wrench in -direction of arrow-.
- Place the camshaft timing chain in such a way that the markings of the camshaft chain/chain sprockets -arrows- are aligned.

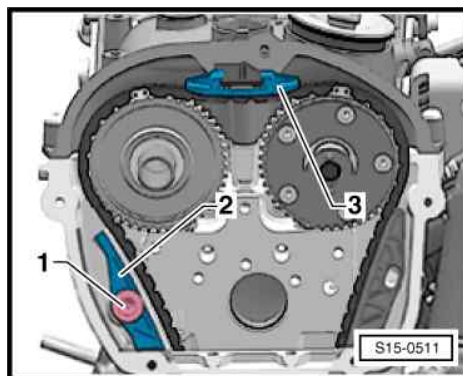


- Install tensioning rail -2- and tighten screw -1- ➔ [page 54](#) .
- Slacken inlet camshaft.
- Install sliding rail -3-.



Note

If the catch is damaged, replace the sliding rail.

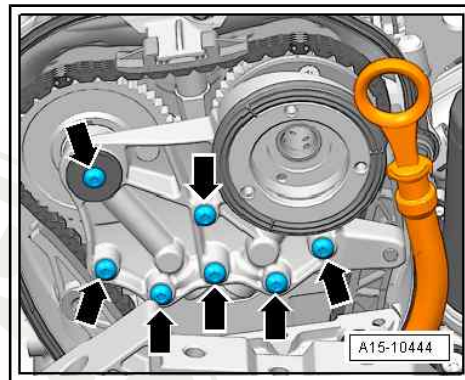




- Fit on bearing bracket and screw in screws -arrows- by hand.
- Remove the locking pin -T40011- .

**Caution**

Carefully crank engine at least 2 revolutions to ensure that no valve touches the piston when the engine is started.



- Tighten the screws -arrows- of the bearing bracket ⇒ [page 54](#) .
- Install control valve (left-hand thread) ⇒ [page 54](#) .

Further installation occurs in reverse order. Pay attention to the following:

- ◆ Tightening torques: ⇒ [page 69](#) .
- Install top cover for timing chain ⇒ [page 48](#) .
- Top up coolant ⇒ [page 114](#) .

4.3 Testing the compression

Special tools and workshop equipment required

- ◆ Spark plug wrench , e.g. - 3122 B-
- ◆ Adapter , e.g. -V.A.G 1381/5A-
- ◆ Compression tester , e.g. -V.A.G 1763-

Test condition

- Engine oil temperature must be at least 30°C.
- Voltage supply o.k.

Test sequence

- Remove the ignition coils with the power output stages and the spark plugs ⇒ [page 241](#) .
- Open lid of E-box in the engine compartment and unplug the fuse of the Motronic current supply relay -J271 - ⇒ Current flow diagrams and Fitting locations.

**Note**

Removing the fuse interrupts the voltage supply of the injection valves and the ignitions coils.

- Check compression pressure with compression tester -V.A.G 1763- , e.g. Adapter -V.A.G 1381/5A - .

**Note**

Use of tester ⇒ Operating Instructions .

- Arrange for the starter to be actuated by a second mechanic.
- Operate starter until the tester no longer indicates a pressure rise.



Compression readings:

new	Wear limit	mx. difference between the cylinders
1.1...1.4 MPa (11.0...14.0 bar)	0.7 MPa (7.0 bar)	0.3 MPa (3.0 bar)

If the specified values are not reached, test the combustion chamber for tightness ⇒ [page 84](#) .

Installation occurs in reverse order to removal. Pay attention to the following:

- Install ignition coils ⇒ [page 241](#) .
- Delete the contents of the fault memory for the engine control unit at the end of the work as error messages were stored due to disconnecting the plugs ⇒ Vehicle diagnosis, testing and information system VAS 5051.

4.4 Testinf the combustion chamber for tightness

Special tools and workshop equipment required

- ◆ Pressure hose -MP1-210 (VW 653/3)- (replace gasket ring with a spark plug gasket ring)
- ◆ Spark plug wrench

Test sequence

- Unscrew the spark plugs.
- Position piston of the relevant cylinder to dead centre.
- Screw the pressure hose MP 1-210 into the spark plug thread.
- Connect pressure hose to compressed air.
- With the assistance of a second mechanic, lock the screw at the crankshaft on TDC position in order to avoid the displacement of the piston after pressure build-up.
- Build up a pressure of approx. 0.3 MPa (3 bar) in the combustion chamber.
- Determine how the pressure escapes:
 - 1 - Via the inlet valve(s) - the pressure enters the throttle valve.
 - 2 - Via the outlet valve(s) - the pressure enters the exhaust system.
 - 3 - Via the piston rings - pressure enters the engine block.

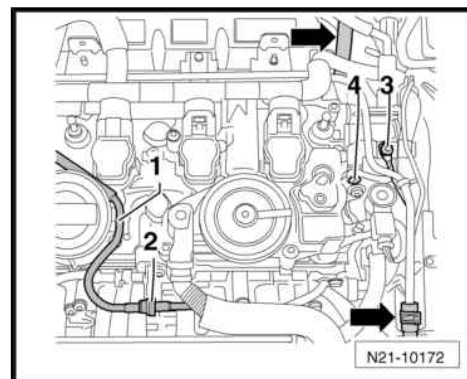
4.5 Removing and installing the vacuum pump

Removing

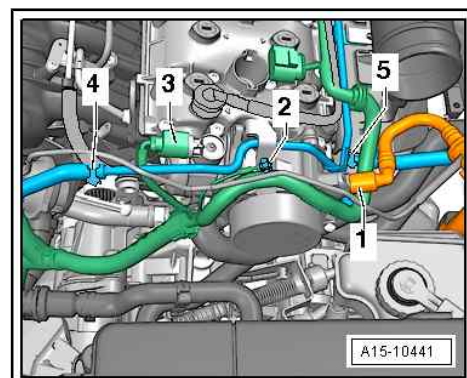
- Remove engine cover.
- Remove the air filter housing ⇒ [page 218](#) .
- Remove high pressure pump “7” with roller tappet ⇒ [page 220](#) .

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- Unbolt earth strap -3- and unscrew the screw -4-.



- Remove the vacuum hose -1- from the vacuum pump.



- Release screws -arrows- and remove vacuum pump.

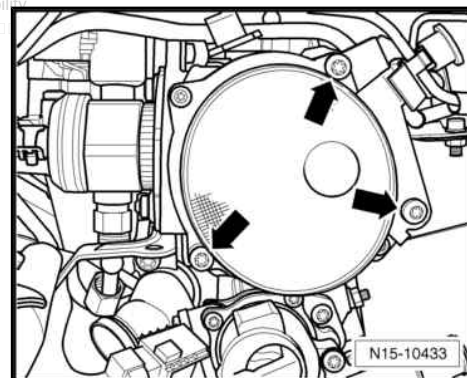


Note

It is not permitted to disassemble the vacuum pump.

Installation occurs in reverse order to removal. Pay attention to the following:

- Clean the sealing surfaces.
- Replace the gasket on the vacuum pump, put through 2 screws and then position the gasket on the cylinder head.



5 Valve gear



Note

- ♦ *Cylinder head and cylinder head cover must always be re-placed together.*
- ♦ *After installing the camshafts, the engine must not be started for about 30 minutes. The hydraulic clearance compensation elements must settle (otherwise valves would strike the pistons).*
- ♦ *After carrying out work on the valve gear, carefully crank engine at least 2 revolutions to ensure that no valve touches the piston when the engine is started.*
- ♦ *Always replace seals and gasket rings.*

5.1 Valve gear - Summary of components

1 - Exhaust valve

- ☐ do not rework, only grinding in is permissible
- ☐ Valve dimensions
⇒ [page 87](#)
- ☐ inspecting valve guides
⇒ [page 97](#)

2 - Cylinder head

3 - Valve guide

- ☐ check ⇒ [page 97](#)

4 - Valve stem seal

5 - Valve spring

6 - Valve spring retainer

7 - Collets

8 - Hydraulic balancing element

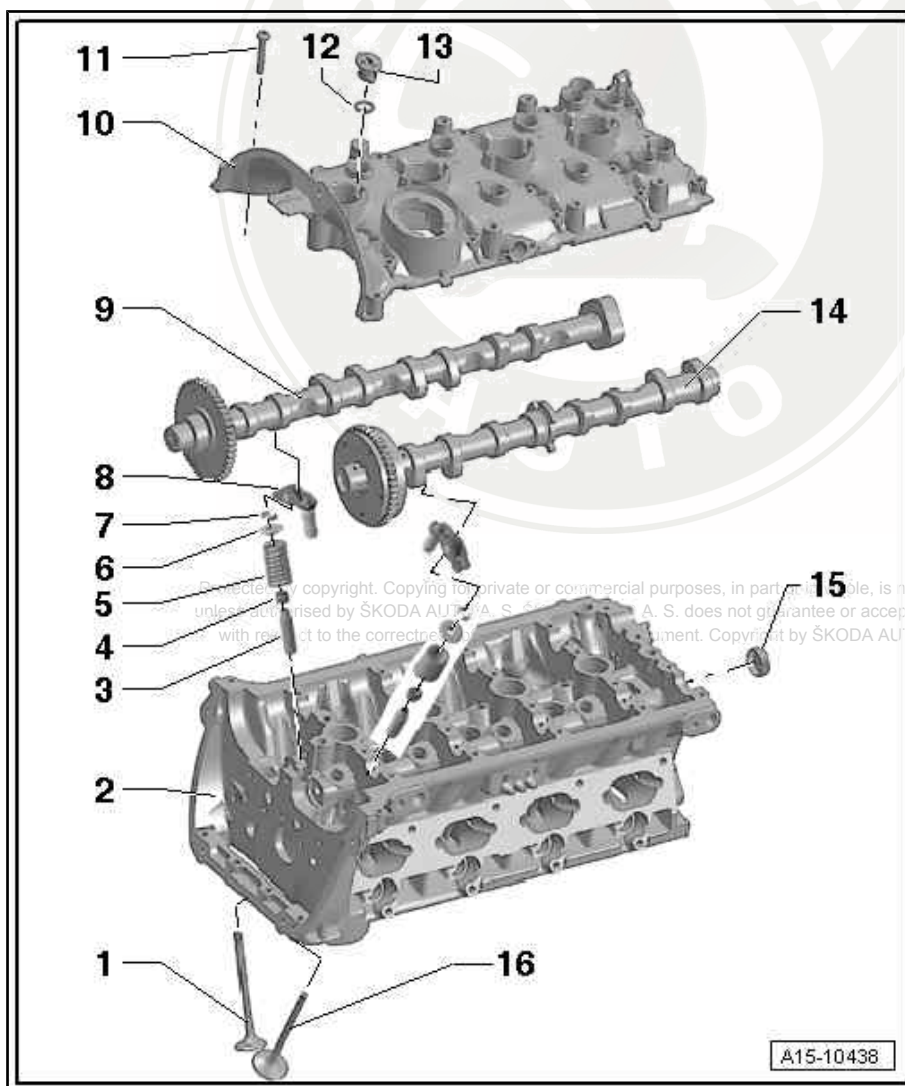
- ☐ do not interchange
- ☐ oil contact surfaces

9 - Exhaust camshaft

- ☐ removing and installing
⇒ [page 87](#)
- ☐ Checking the axial play of the camshafts
⇒ [page 93](#)
- ☐ Slack: max. 0.04 mm

10 - Cylinder head cover

- ☐ with integrated camshaft bearing
- ☐ removing and installing
⇒ [page 87](#)
- ☐ Cleaning and reworking sealing surface not permissible
- ☐ remove old sealant residues





11 - 8 Nm + torque a further 90° (1/4 turn)

- ☐ replace
- ☐ order of tightening ⇒ [page 87](#)

12 - O-ring

- ☐ replace
- ☐ moisten with engine oil

13 - Plug

14 - Inlet camshaft

- ☐ removing and installing ⇒ [page 87](#)
- ☐ Checking the axial play of the camshafts ⇒ [page 93](#)
- ☐ Slack: max. 0.04 mm

15 - Screw cap

- ☐ replace
- ☐ installing: Plunge into the middle of the cover using a screwdriver and lever out.
- ☐ installing: Use no sealant, press in with pressure plate -T10174 - 1...2 mm deep.

16 - Inlet valve

- ☐ do not rework, only grinding in is permissible
- ☐ Valve dimensions ⇒ [page 87](#)
- ☐ inspecting valve guides ⇒ [page 97](#)

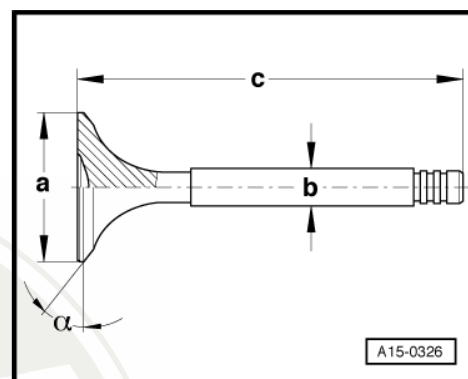
Valve dimensions



Note

Inlet and exhaust valves must not be reworked. Only grinding in with grinding paste is permissible.

Dimension		Inlet valve	Exhaust valve
Ø a	mm	33,85 ± 0,10	28,0 ± 0,1
Ø b	mm	5,98 ± 0,007	5,965 ± 0,007
c	mm	103,97	101,87
α	∠°	45	45



5.2 Removing and installing camshafts

Special tools and workshop equipment required

- ◆ Thrust piece -T10174-
- ◆ Assembly tool -T10352- or assembly tool -T10352/1-
- ◆ Counterholder -T10355 -
- ◆ Rig pin -T40011-
- ◆ Protective goggles
- ◆ Protective gloves
- ◆ Silicone sealant -D 154 103 A1-
- ◆ Cleaning and degreasing agent , e.g. -D 000 401 04-
- ◆ Sealant remover gasket stripper (bearing code GST, part number R 34402), manufacturer Retech s.r.o.

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Note

- ◆ *The sealing surfaces at the bottom cylinder head cover and at the top of cylinder head must not be machined.*
- ◆ *The camshaft bearings are integrated in the cylinder head and in the cylinder head cover. The camshaft timing chain must be slackened before the removal of the cylinder head cover.*
- ◆ *If the cylinder head cover was released, it is necessary to replace the end cover between cylinder head cover and cylinder head.*

Removing

- Remove the sound dampening system ⇒ Body Work; Rep. Gr. 50 .
- Remove the front right wheelhouse liner ⇒ Body Work; Rep. Gr. 66 .

Vehicles with auxiliary heating.

- Slacken the clamp -1- and release the screw -2-.
- Remove silencer for auxiliary heating.

Continued for all vehicles

- Screw out screws -arrows-.
- Remove charge-air pipe. To do so lift retaining clips -pos. 1 and 2-.
- Remove top cover for timing chain ⇒ [page 48](#) .

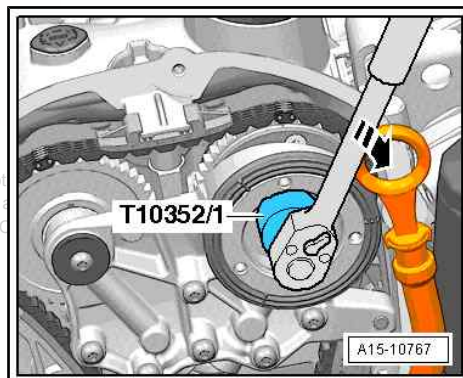
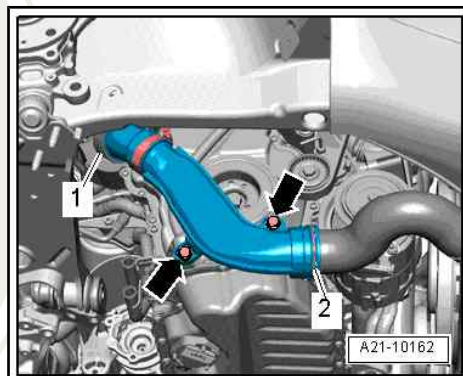
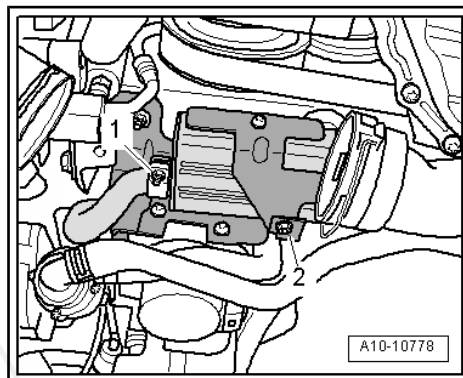


Caution

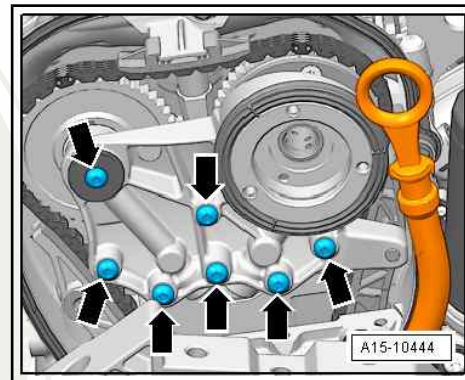
The control valve has a left-hand thread.

- Remove the control valve in the -direction of the arrow-:
- ◆ for engine identification character BZB with assembly tool - T10352-
- ◆ for engine identification characters CDAA, CDAB, CCZA with assembly tool -T10352/1-

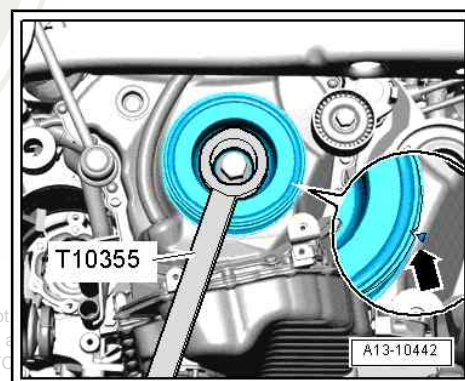
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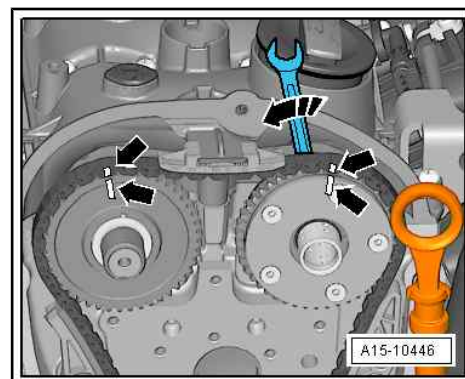
- Release screws -arrows- and remove bearing bracket.



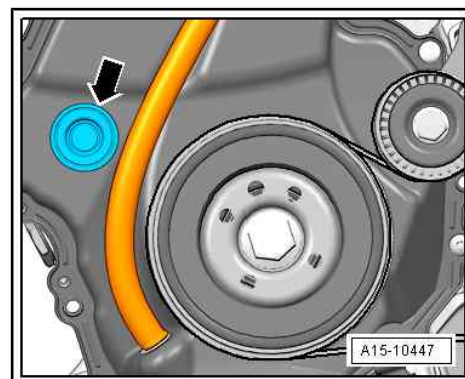
- Turn the vibration damper with the counterholder -T10355- in to position "TDC for cylinder 1" -arrow-.
- The notch at the vibration damper must be opposite the arrow marking on bottom cover for timing chain.



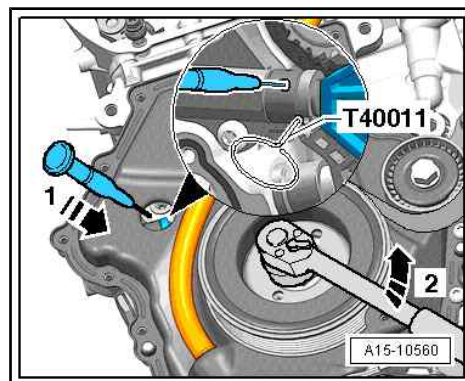
- Mark position of camshaft timing chain/chain sprockets -arrows- with an indelible pen.



- Remove plug -arrow-.



- Lift the locking wedge of the chain tensioner. For this step, insert a scriber or a suitable screwdriver into the hole of the chain tensioner -direction of arrow 1-.
- Turn the crankshaft in opposite direction of rotation of engine -direction of arrow 2- while the locking wedge is raised and secure the chain tensioner with the rig pin -T40011 - .
- Turn the crankshaft back to “TDC for cylinder 1”.



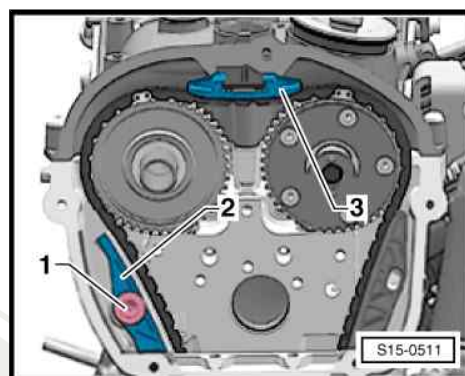
- Screw out screw -1- and guide tensioning rail -2- downwards.



Note

The inlet camshaft jumps in the running direction of the engine.

- Remove upper sliding rail -3-. To do so release the catch with a screwdriver and press the sliding rail off the cylinder head cover.



Note

On an installed bottom cover for timing chain, the slackened chain “can” “not” skip the crankshaft.

- Remove camshaft timing chain from the chain sprockets.

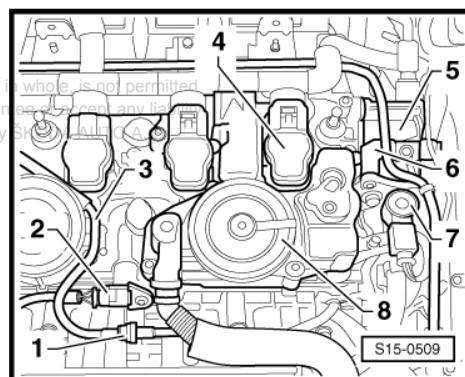


Caution

Risk of damage to the valve drive!

- ◆ *If the camshaft timing chain was removed from the chain sprockets, the crankshaft must no longer be turned.*
- ◆ *Panels are attached to the bottom cover for timing chain, which prevent the chain from slipping off. If the crankshaft is turned while the chain is slackened, the panels may bend.*

- Remove the air filter housing ➔ [page 218](#) .
- Separate vacuum line -3- at the connection point -1- and expose.
- Disconnect plugs -2- from hall sender -G40 - .
- Unscrew coolant line -6- from the vacuum pump.
- Remove high pressure pump -7- ➔ [page 84](#) .
- Remove vacuum pump -5- ➔ [page 69](#) .
- Remove ignition coils -4- ➔ [page 241](#) .
- Remove crankcase ventilation -8-.





- Release screws for cylinder head cover in the sequence -1...6- as follows.
- Remove cylinder head cover.
- Carefully lift out camshafts and place down on a clean surface.

**WARNING**

Wear protective gloves when working with sealant and grease remover!

- Remove the old sealant from the grooves of the cylinder head cover as well as from all the sealing surfaces of the cylinder head cover and cylinder head with a chemical sealant remover.

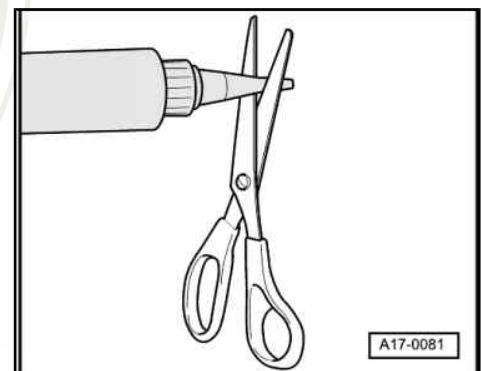
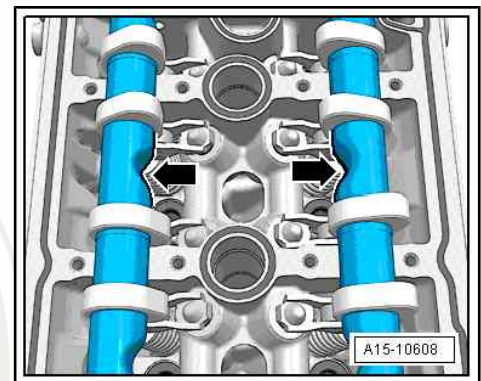
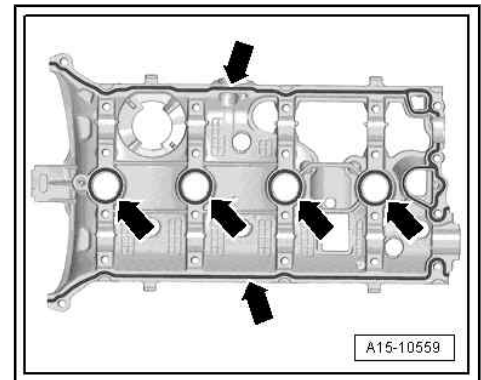
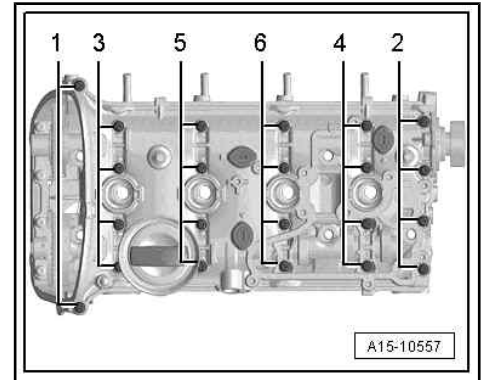
Ensure that no dirt and sealant residues get into the cylinder head.

- Degrease the sealing surfaces.

Install**Note**

- ◆ *The sealing surfaces must be free of oil and grease.*
- ◆ *The pistons must not be positioned at top dead centre.*
- ◆ *Ensure that all roller rocker arms are correctly positioned on the valve stem ends.*
- Oil the contact surfaces of the camshafts.
- Carefully insert the camshafts into the camshaft bearings of the cylinder head. The recesses -arrows- must be seated vertically opposite each other.
- Replace screws for cylinder head cover.

- Cut off nozzle tube at the front marking (Ø of nozzle approx. 2 mm).

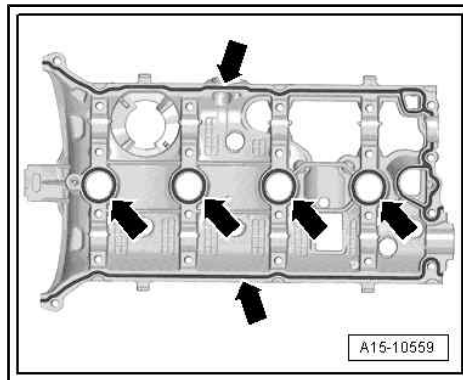


- Apply silicone sealant -arrows- to the clean sealing surface on the cylinder head cover, as shown in the illustration.
- ♦ Thickness of sealant bead: 2...3 mm



Note

- ♦ Pay attention to the use by date on sealant.
- ♦ The sealant bead must not be thicker than recommended otherwise excess sealant may get into the oil pan and clog the strainer in the oil suction pipe.
- ♦ The cylinder head cover should be fitted on and bolted without any interruption as the sealant immediately begins hardening as soon as the sealing surfaces come into contact.

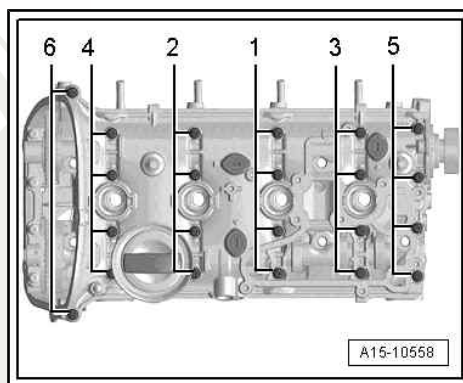


- Position the cylinder head cover without tilting it.
- Tighten the new screws in several stages.
 1. Screw in screws in the sequence -1...6- in several stages by hand.
 2. Tighten the bolts in the sequence -1...6- to 8 Nm.
 3. Tighten further 90° in the sequence -1...6- with a rigid wrench.



Note

Make sure that the cylinder head cover does not tilt.



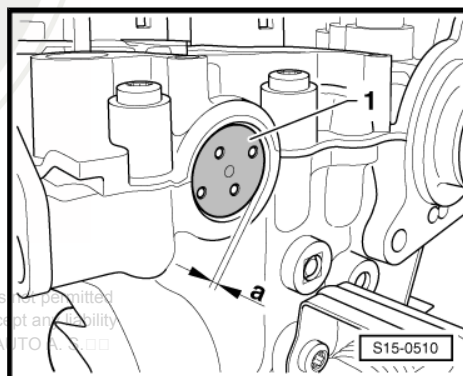
- Drive in the cap -1- with the pressure plate -T10174- .
- a-: 1...2 mm



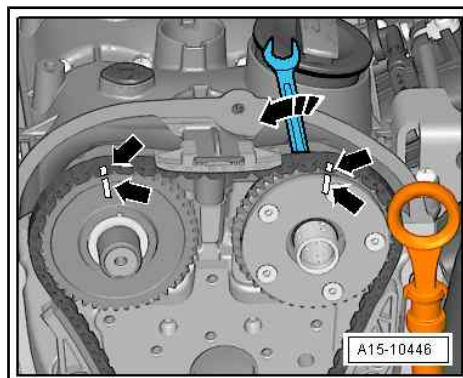
Note

The following work sequence must be performed in one work step, to do so a second mechanic is required.

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- Turn inlet camshaft with wrench in -direction of arrow-.
- Place the camshaft timing chain in such a way that the markings of the camshaft chain/chain sprockets -arrows- are aligned.

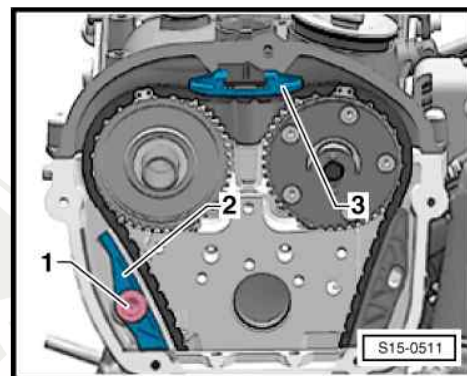




- Install tensioning rail -2- and tighten screw -1- ➔ [page 54](#) .
- Slacken inlet camshaft.
- Install sliding rail -3-.

**Note**

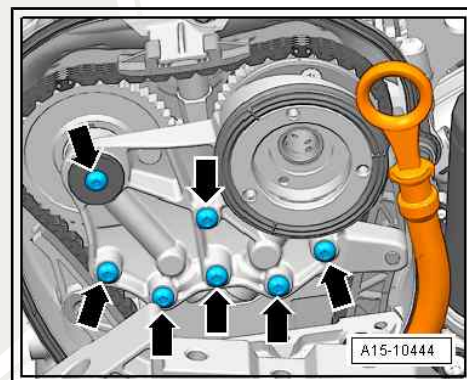
If the catch is damaged, replace the sliding rail.



- Fit on bearing bracket and screw in screws -arrows- by hand.
- Remove the locking pin -T40011- .

**Caution**

Carefully crank engine at least 2 revolutions to ensure that no valve touches the piston when the engine is started.



- Tighten the screws -arrows- of the bearing bracket ➔ [page 54](#) .
- Install control valve (left-hand thread) ➔ [page 54](#) .

Further installation occurs in reverse order. Pay attention to the following:

- Observe the tightening sequence of crankcase ventilation ➔ [page 71](#) .
- Install top cover for timing chain ➔ [page 48](#) .
- Install vacuum pump ➔ [page 84](#) .
- Install high pressure pump ➔ [page 220](#) .
- Install ignition coils ➔ [page 241](#) .

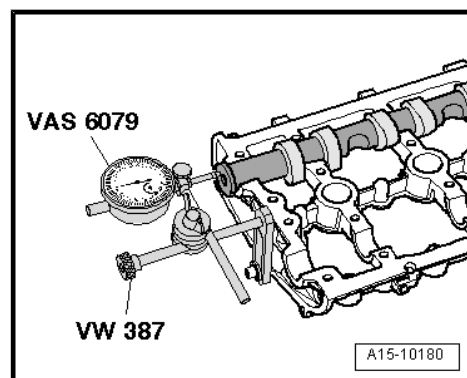
5.3 Checking the axial play of the camshafts

Special tools and workshop equipment required

- ◆ Universal dial gauge holder -MP 3-447 (VW 387)-
- ◆ Dial gauge
- Cylinder head cover removed

Test sequence

- Insert the camshaft to be checked into the cylinder head cover.
- Attach the dial gauge to the cylinder head cover with a universal dial gauge holder -MP 3-447 (VW 387)- .
- Press the camshaft by hand against the dial gauge.
- Set the dial gauge to "0".
- Press the camshaft off the dial gauge and read the value:
Axial play: 0.05 ... 0.17 mm





5.4 Replacing valve stem seals

(with cylinder head installed)

Special tools and workshop equipment required

- ◆ Spark plug wrench , e.g. - 3122 B-
- ◆ Valve supporting plate -MP 1-218-
- ◆ Valve stem seal extractor -MP 1-230 (3364)-
- ◆ Valve stem seal insertion tool - MP 1-233 (3365)-
- ◆ Adapter -T40012-
- ◆ Disassembly and assembly device for valve collets -VAS 5161-
- ◆ Guide plate for FSI Engine -VAS 5161/19B -

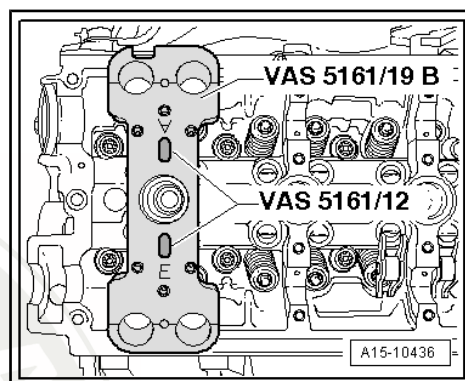
Removing



Note

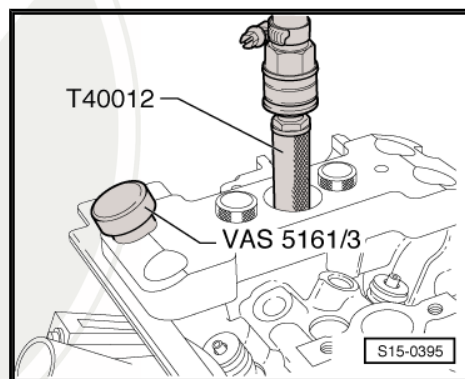
With cylinder head removed, use valve supporting plate -MP 1-218- .

- Remove the camshafts ⇒ [page 87](#) .
- Unscrew the spark plugs.
- Remove the roller rocker arms and place on a clean surface. Make sure that you do not mix up the roller rocker arms.
- Tighten the guide plate for FSI engine -VAS 5161/19B- using the knurled screws -VAS 5161/12- on the cylinder head as shown.
- Put the piston of the relevant cylinder at "bottom dead centre".



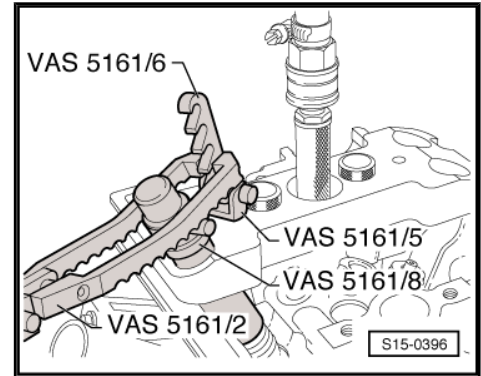
- Screw adapter -T40012- into the spark plug thread and apply compressed air of at least 0.6 MPa (6 bar) overpressure.
- If valve collets are tight, knock off using the impact drift -VAS 5161/3- and a plastic hammer.

For inlet side

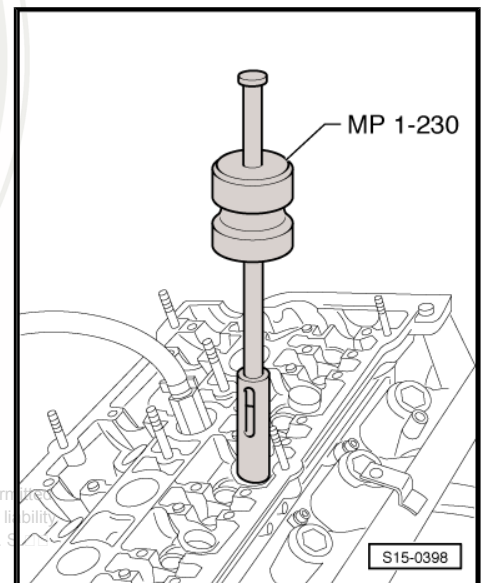
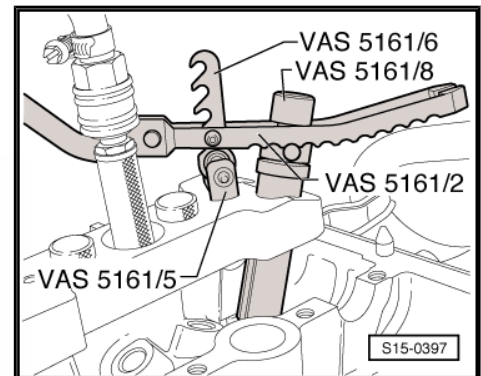


- Screw in the detent part -VAS 5161/6- with interlocking fork -VAS 5161/5- into the central thread of the guide plate for FSI engine -VAS 5161/19B- .
- Insert the assembly cartridge -VAS 5161/8- into the guide plate for FSI engine -VAS 5161/19B- .
- Hook the pressure fork -VAS 5161/2- onto the detent part -VAS 5161/6- .

For outlet side

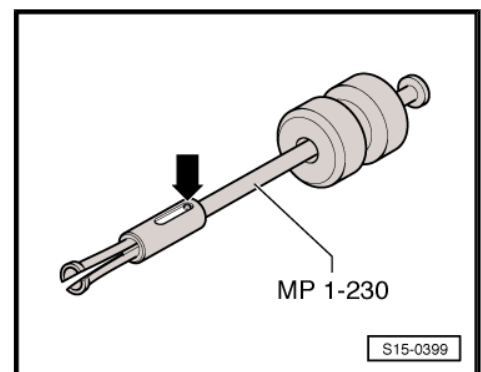


- Screw the detent part -VAS 5161/6- with the interlocking fork -VAS 5161/5- into the outer thread of the guide plate for FSI engine -VAS 5161/19B- .
- Press down the assembly cartridge -VAS 5161/8- . Turn simultaneously the knurled screw of the assembly cartridge -VAS 5161/8- to the right, until the tips click into the valve collets.
- Slightly move back and forward the knurled screw. This presses the valve collets apart and installs them into the assembly cartridge.
- Release the pressure fork -VAS 5161/2- .
- Remove assembly cartridge -VAS 5161/8- .
- Unscrew guide plate for FSI Engine -VAS 5161/19B- .
- Pull off valve stem seals with the extractor -MP 1-230- .



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- If the extractor -MP 1-230- cannot be used because of cramped working conditions, drive out the tensioning pin -arrow- with a drift and remove the fitting adapter.

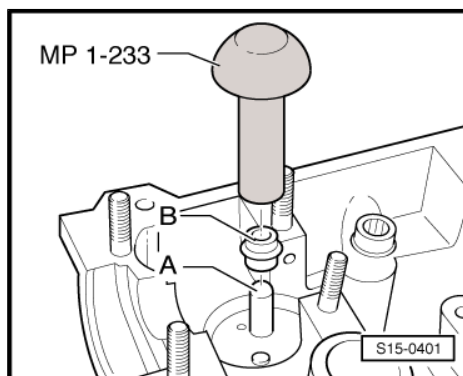
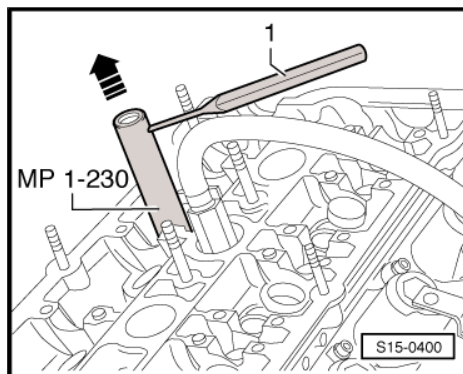




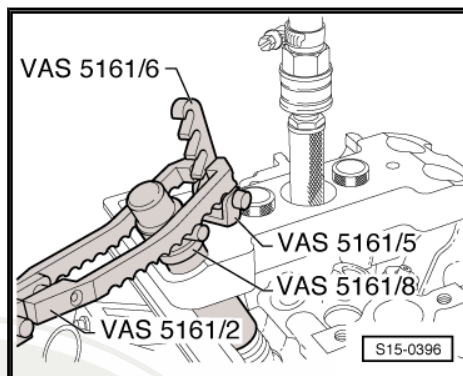
- Position the lower part of the extractor -MP 1-230- on the valve stem seal.
- Insert the drift -1- into the hole in the lower part of the extractor.
- Position an assembly lever on the assembly device and pull out the valve stem seal -arrow-.

Install

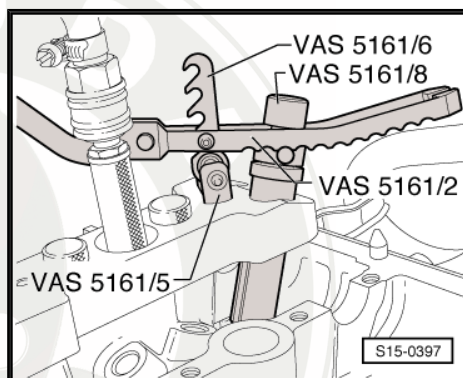
- To avoid damaging the new valve stem seals insert plastic bushing -A- on the valve stem seals -B-.
- Oil the sealing lips of the valve stem seal -B-, insert into the insertion tool for valve stem seal - MP 1-233- and carefully push onto the valve guide.
- Remove plastic bushing -A-.
- Insert the valve spring and the valve spring retainer.
- Install the disassembly and assembly device -VAS 5161- as shown.



Inlet side



Outlet side



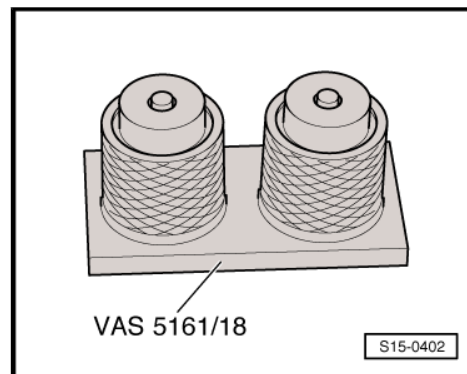


Note

- ◆ *If the valve collets were removed from the assembly cartridge, first of all they must be inserted into the insertion device - VAS 5161/18- .*
- ◆ *Press assembly cartridge -VAS 5161/8- from the top onto the insertion device and lift up the valve collets.*
- Press down the assembly cartridge -VAS 5161/8 - with the pressure fork -VAS 5161/2- , turn the knurled screw of the assembly cartridge back and forward and while doing so pull it towards the top.
- Release the pressure fork on tightened knurled screw -VAS 5161/2- of the assembly cartridge -VAS 5161/8- .
- Remove disassembly and assembly device for valve keys - VAS 5161- as shown.

Further installation occurs in reverse order. Pay attention to the following:

- Install camshafts [⇒ page 87](#) .



5.5 Inspect valve guides

Special tools and workshop equipment required

- ◆ Universal dial gauge holder -MP 3-447 (VW 387)-
- ◆ Dial gauge

Test sequence

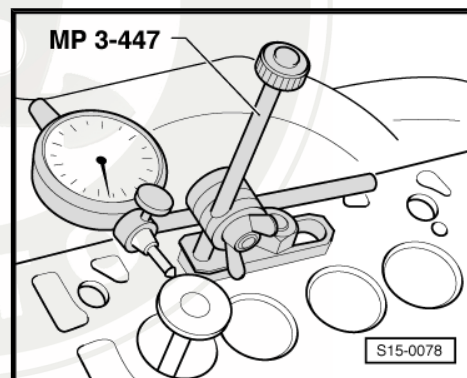
- Insert valve into the guide. End of valve stem must be flush with guide. Because of the different stem diameters only use inlet valve in inlet guide or outlet valve in outlet guide.
- Determine valve rock.

The minimum dimension for inlet and exhaust valve: 0.8 mm



Note

- ◆ *If the wear limit is exceeded, repeat measurement with new valves. If the wear limit is again exceeded, replace cylinder head. The valve guides cannot be replaced.*
- ◆ *If the valve is replaced when carrying out repair work, use a new valve for the measurement.*



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17 – Lubrication

1 Oil pan and oil pump



Note

- ♦ If considerable quantities of metal swarf or abrasion is found in the engine oil when carrying out engine repairs, carefully clean the oil galleries in order to avoid consequential damage and additionally replace the engine oil cooler, the oil spray jets and the oil filter.
- ♦ The oil level must not be above the max. marking - risk of damage to catalytic converter!

Inspecting oil pressure ⇒ [page 107](#) .

Check the engine oil, amount of oil and oil specification ⇒ Maintenance ; Octavia II

1.1 Oil pan and oil pump - Overview of the components

1 - Oil level and oil temperature sender -G266 -

2 - Gasket

- ☐ replace

3 - 8 Nm + torque a further 45°
(1/8 turn)

- ☐ replace
- ☐ order of tightening
⇒ [page 99](#)

4 - The lower part of the oil pan

- ☐ removing and installing
⇒ [page 99](#)

5 - 9 Nm

6 - Baffle

- ☐ replace

7 - 9 Nm

8 - Oil pump

- ☐ removing and installing
⇒ [page 101](#)

9 - Fitting sleeve

10 - Chain tensioner

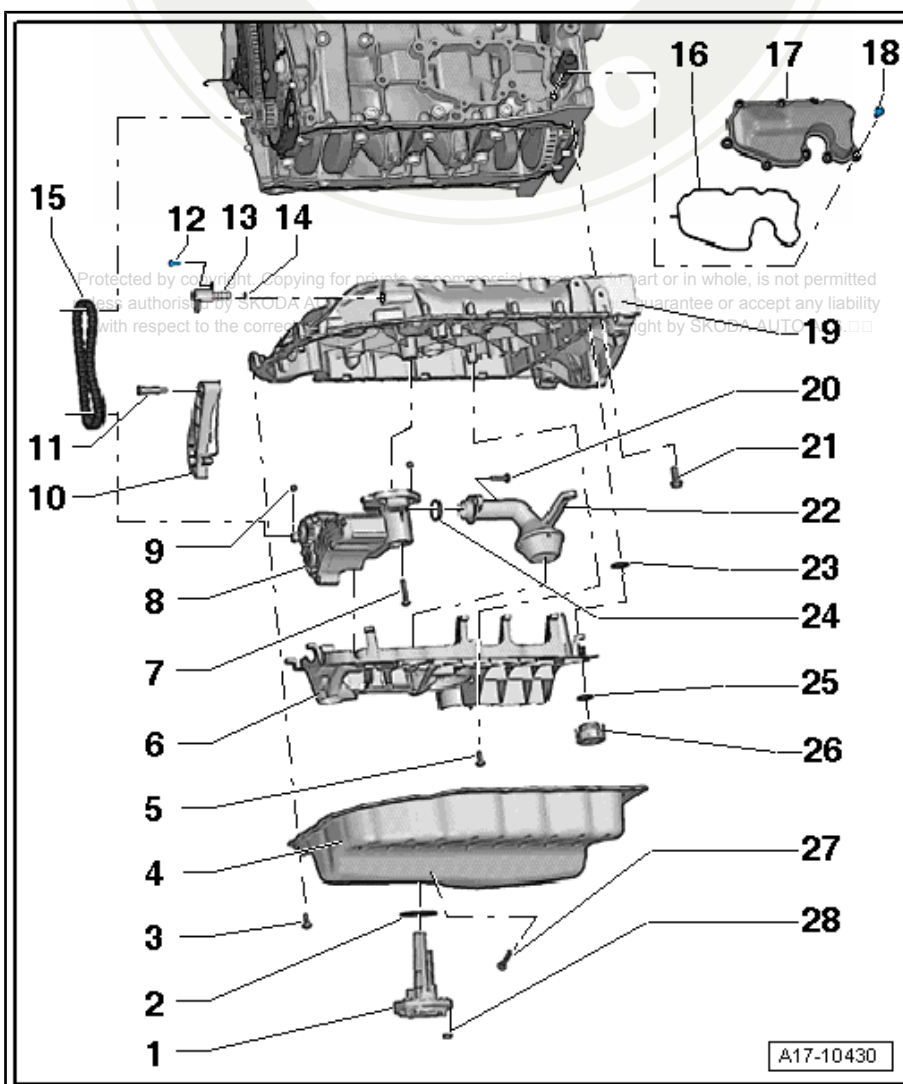
11 - 9 Nm

12 - 9 Nm

- ☐ only on engines with identification characters CDAA, CDAB, CCZA

13 - Valve for oil pressure control -N428-

- ☐ only on engines with identification characters CDAA, CDAB, CCZA





14 - O-ring

- ☐ only on engines with identification characters CDAA, CDAB, CCZA
- ☐ replace

15 - Drive chain for oil pump

- ☐ before removing mark running direction

16 - Gasket

- ☐ replace

17 - Oil separator

18 - 9 Nm

- ☐ order of tightening ⇒ [page 99](#)

19 - Upper part of the oil pan

- ☐ removing and installing ⇒ [page 102](#)

20 - 9 Nm

21 - 15 Nm + torque a further 90° (1/4 turn)

- ☐ replace
- ☐ order of tightening ⇒ [page 102](#)

22 - Suction line

- ☐ Clean strainer if dirty

23 - O-ring

- ☐ replace

24 - Sealing ring

- ☐ replace

25 - O-ring

- ☐ replace

26 - Non-return valve

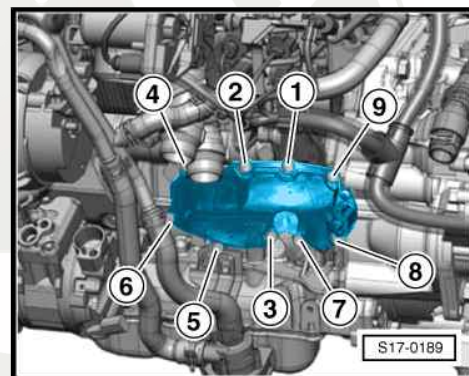
27 - Oil drain plug, 30 Nm

- ☐ replace

28 - 9 Nm

Oil scraper - tightening sequence

- Tighten the bolts in the sequence -1 through 9- to 9 Nm.



1.2 Removing and installing the lower part of the oil pan

Special tools and workshop equipment required

- ◆ Catch pan e.g. -VAS 6208 -

- ◆ Cleaning and degreasing agent , e.g. -D 000 401 04-

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- ◆ Sealant remover gasket stripper (bearing code GST, part number R 34402), manufacturer Retech s.r.o.
- ◆ Silicone sealant -D 174 003 A2-

Removing

- Remove the sound dampening system ⇒ Body Work ⇒ Rep. Gr. 50 .
- Drain engine oil.



Note

Please observe the disposal instructions!

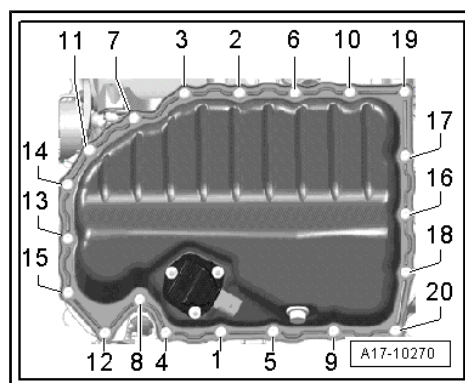
- Disconnect plug from oil level and oil temperature sender - G266- .
- Unscrew oil pan screws -1- to -20-.
- Remove the lower part of the oil pan. It may be necessary to loosen the lower part of the oil pan using light blows with a rubber hammer.

Install



WARNING

Wear protective gloves when working with sealant and grease remover!

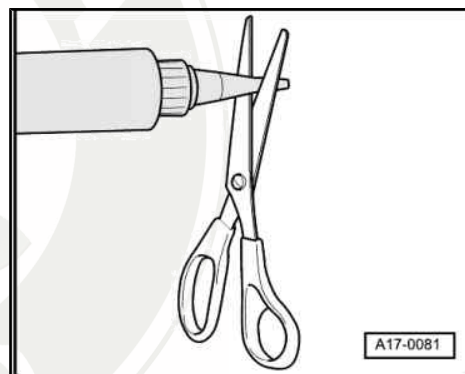


- Remove sealant residues from sealing surface on upper part of the oil pan and on lower part of the oil pan with chemical sealant remover.
- Degrease the sealing surfaces.



Note

- ◆ *Pay attention to the use by date on sealant.*
- ◆ *The oil pan must be installed immediately and tightened after applying the sealant.*
- Cut off nozzle tube at the front marking (Ø of nozzle approx. 3 mm).





- Apply silicone sealant to the clean sealing surface of the lower part of the oil pan as shown. Sealant bead must:
 - ◆ be 2...3 mm thick
 - ◆ run past the area around the bolt holes on the inside -arrow-

**Note**

The sealant bead must not be thicker otherwise excess sealant may get into the oil pan and block the strainer in the oil pump suction pipe.

- Attach the lower part of the oil pan immediately and tighten the new screws in the sequence -1 to 20-.
1. Tighten screws to 8 Nm.
 2. Torque screws a further 45°.

**Note**

After installing the oil pan, allow the sealant to dry for about 30 minutes. Only then may engine oil be filled in.

Further installation occurs in reverse order. Pay attention to the following:

- Topping up with engine oil ⇒ Maintenance ; Octavia II .

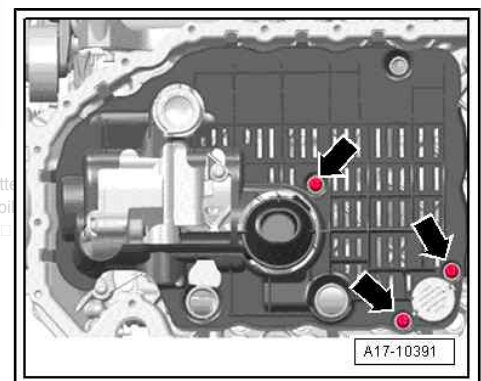
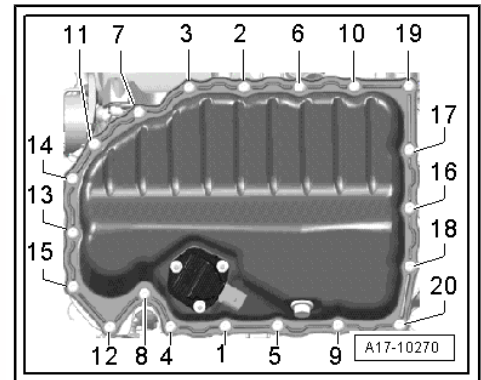
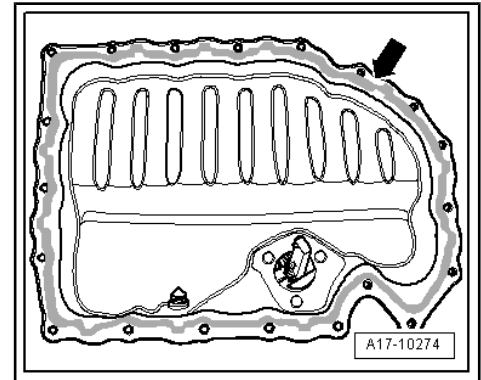
1.3 Removing and installing oil pump

Special tools and workshop equipment required

- ◆ Assembly tool -T10118-

Removing

- Remove the lower part of the oil pan ⇒ [page 99](#)
- Remove baffle -arrows-.



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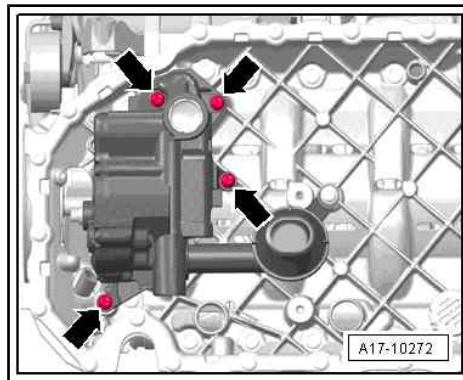


- Screw out screws -arrows-.



Note

For the following working step a second mechanic is required.

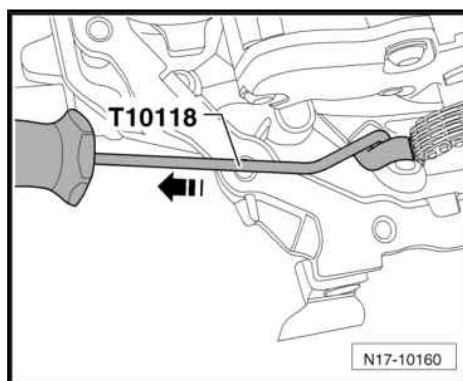


- Pull back the chain tensioner with the assembly tool -T10118 - and swivel out the oil pump with chain sprocket.

Install

Further installation occurs in reverse order. Pay attention to the following:

- ◆ Tightening torques ⇒ [page 98](#)
- Before installing the oil pump, check the strainer in the suction line and the oil ducts in the upper part of the oil pan for contamination.
- Check if both dowel sleeves for centering the oil pump are present.
- Replace baffle.



Note

There is a plastic ribbing on the baffle, which forever deforms when tightening. The plastic ribbing ensures that the baffle is tight and does not rattle. For this reason the baffle must always be replaced.

- Install the lower part of the oil pan ⇒ [page 99](#) .

1.4 Removing and installing the upper part of the oil pan

Special tools and workshop equipment required

- ◆ Assembly tool -T10118-
- ◆ Cleaning and degreasing agent , e.g. -D 000 401 04-
- ◆ Sealant remover gasket stripper (bearing code GST, part number R 34402), manufacturer Retech s.r.o.
- ◆ Silicone sealant -D 174 003 A2-

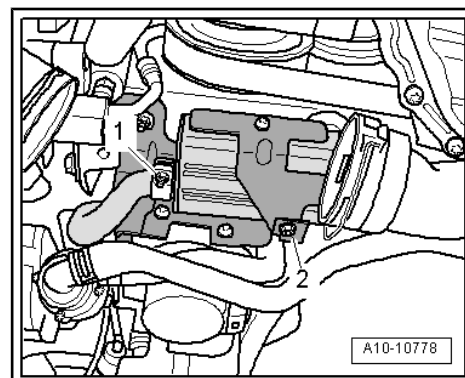
Removing

- Remove the sealing flange on the gearbox side ⇒ [page 35](#) .
- Remove oil pump ⇒ [page 101](#) .
- Remove the front right wheelhouse liner ⇒ Body Work; Rep. Gr. 66 .

Vehicles with auxiliary heating.

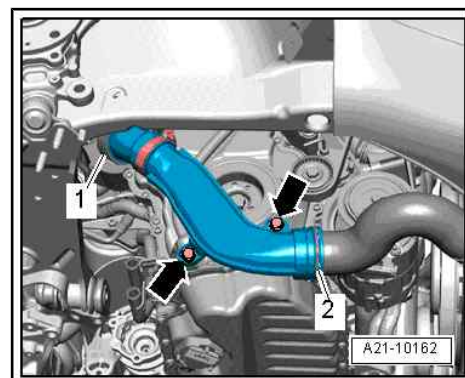
- Slacken the clamp -1- and release the screw -2-.
- Remove silencer for auxiliary heating.

Continued for all vehicles



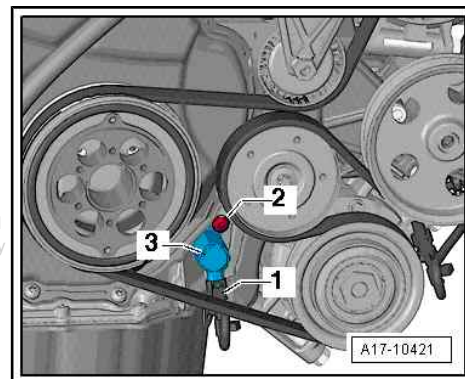
- Screw out screws -arrows-.
- Remove charge-air pipe. To do so lift retaining clips -pos. 1 and 2-.
- Unscrew charge-air pipe from upper part of oil pan.
- Unscrew bracket for wiring loom at upper part of oil pan.

For engines with identification characters CDAA, CDAB, CCZA



- Disconnect plug -1- from the valve for oil pressure control - N428 - -3-.

Continued for all vehicles



- Release screws -14 and 15- from bottom cover for timing chain.



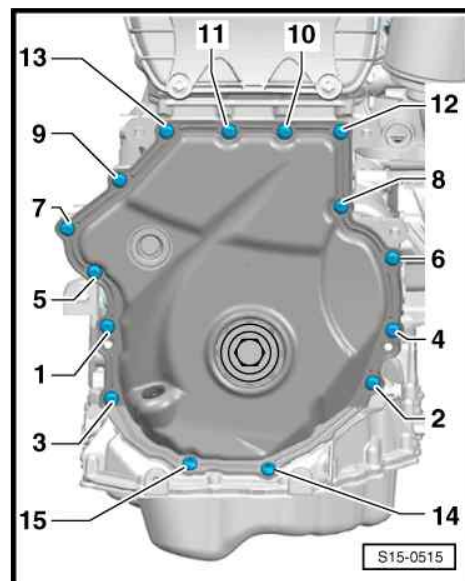
Caution

In order to avoid future leakage, do not deform the bottom cover for the timing chain and do not grip between the screw points when pressing off the oil pan upper part.



WARNING

Risk of accident! When removing the upper part of the oil pan, the spring of the chain tensioner for the oil pump drive jumps from the upper part of the oil pan to the bottom cover for the timing chain. When removing the upper part of the oil pan, do not grip between the upper part of the oil pan and the bottom cover for the timing chain.





- Release screws -1 through 14- and remove upper part of oil pan. It may be necessary to loosen the upper part of the oil pan using light blows with a rubber hammer.

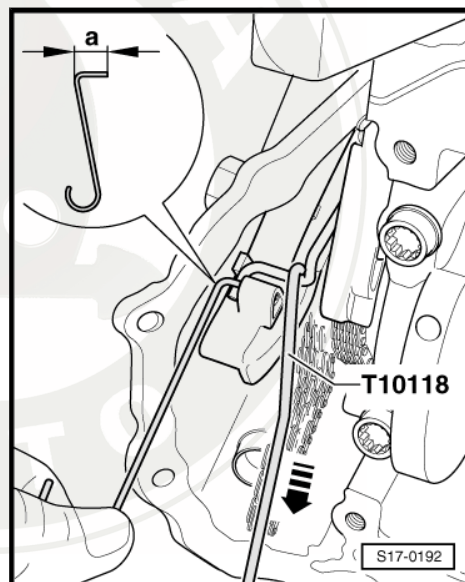
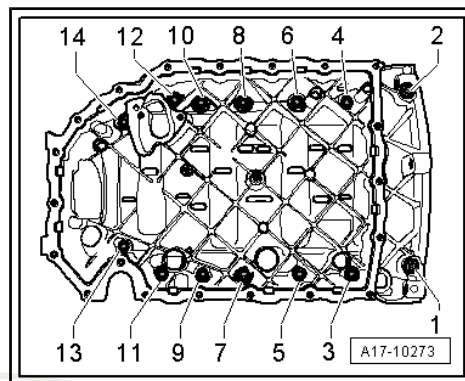
Install**WARNING**

Wear protective gloves when working with sealant and grease remover!

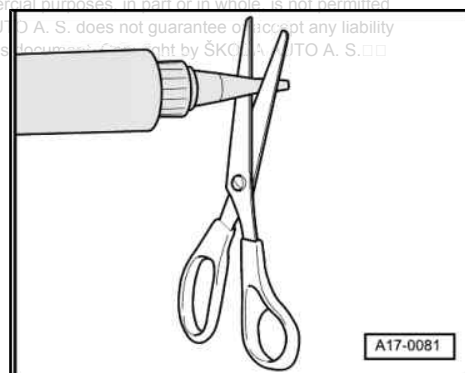
- Remove residual sealant from the sealing surface on the cylinder block, the upper part of the oil pan and on the bottom cover for timing chain with chemical sealant remover.
- Degrease the sealing surfaces.
- Check the oil ducts in upper part of oil pan and in cylinder block for contamination.
- Make an auxiliary tool out of wire from $\varnothing$ 1.8 to 2.0 mm, as shown in the illustration. Dimension -a- = approx. 10 mm.
- Pull the tensioning spring of the drive chain tensioner for the oil pump with assembly tool -T10118 - in -direction of arrow- and secure by sliding the auxiliary tool into the hole ($\varnothing$ 2.2 mm) in the tensioner.

**Note**

- ♦ Pay attention to the use by date on sealant.
- ♦ The upper part of the oil pan must be installed immediately and tightened after applying the sealant.



- Cut off nozzle tube at the front marking ($\varnothing$ of nozzle approx. 3 mm).

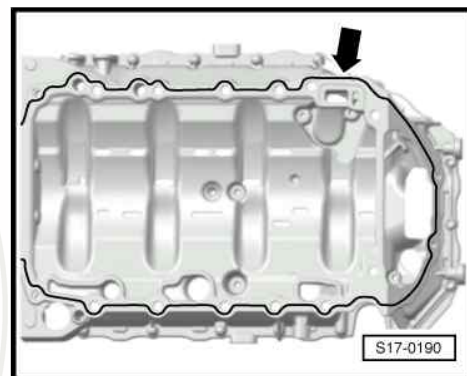




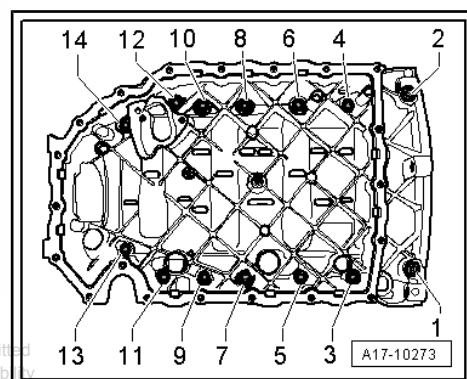
- Apply silicone sealant (as shown) -arrow- to the clean sealing surface of the upper part of the sealing flange.
- The sealant bead must be 2...3 mm thick.

**Note**

The sealant bead must not be thicker otherwise excess sealant may get into the oil pan and block the strainer in the oil pump suction pipe.



- Attach the upper part of the oil pan immediately and align it to the gearbox side flat to the cylinder block and tighten the new screws in the sequence -1 to 14- as follows:
- 1. Tighten screws to 15 Nm.
- 2. Torque screws a further 90°.

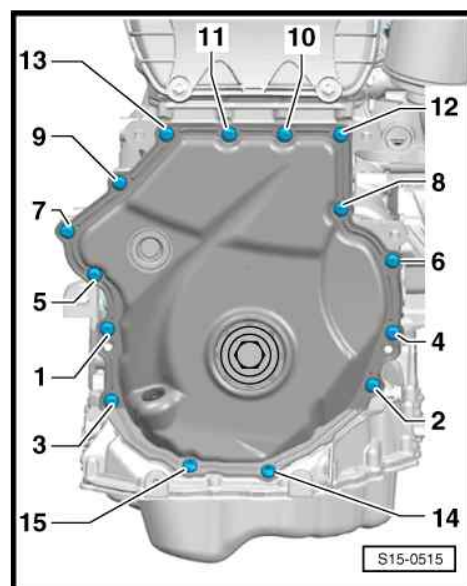


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- Tighten new screws -14 and 15- to 8 Nm and torque a further 45° (1/8 turn).
- Release the auxiliary tool from the drive shaft tensioner of the oil pump using a screwdriver.

Further installation occurs in reverse order. Pay attention to the following:

- Install the sealing flange on the gearbox side ⇒ [page 35](#) .
- Install oil pump ⇒ [page 101](#) .



2 Bracket for auxiliary units with oil filter and engine oil cooler

2.1 Bracket for auxiliary units with oil filter and engine oil cooler - Summary of components

1 - Bracket for auxiliary units

- ☐ with integrated oil filter holder
- ☐ removing and installing ➔ [page 29](#)

2 - Oil pressure switch -F1/F22-

- ☐ on engine with identification characters BZB: Oil pressure switch -F1- 0.12 - 0.16 MPa (1.2 - 1.6 bar) black
- ☐ on engine with identification characters CDAA, CDAB, CCZA: Oil pressure switch -F22- 0.215 - 0.295 MPa (2.15 - 2.95 bar) blue
- ☐ check ➔ [page 107](#)
- ☐ Tightening torque: 20 Nm

3 - Oil pressure switch for reduced oil pressure -F378-

- ☐ only on engine with identification characters CDAA, CDAB, CCZA
- ☐ 0.055 - 0.085 MPa (0.55 - 0.85 bar) brown
- ☐ check ➔ [page 107](#)
- ☐ Tightening torque: 20 Nm

4 - Gasket

- ☐ replace

5 - O-ring

- ☐ one part with valve unit

6 - O-ring

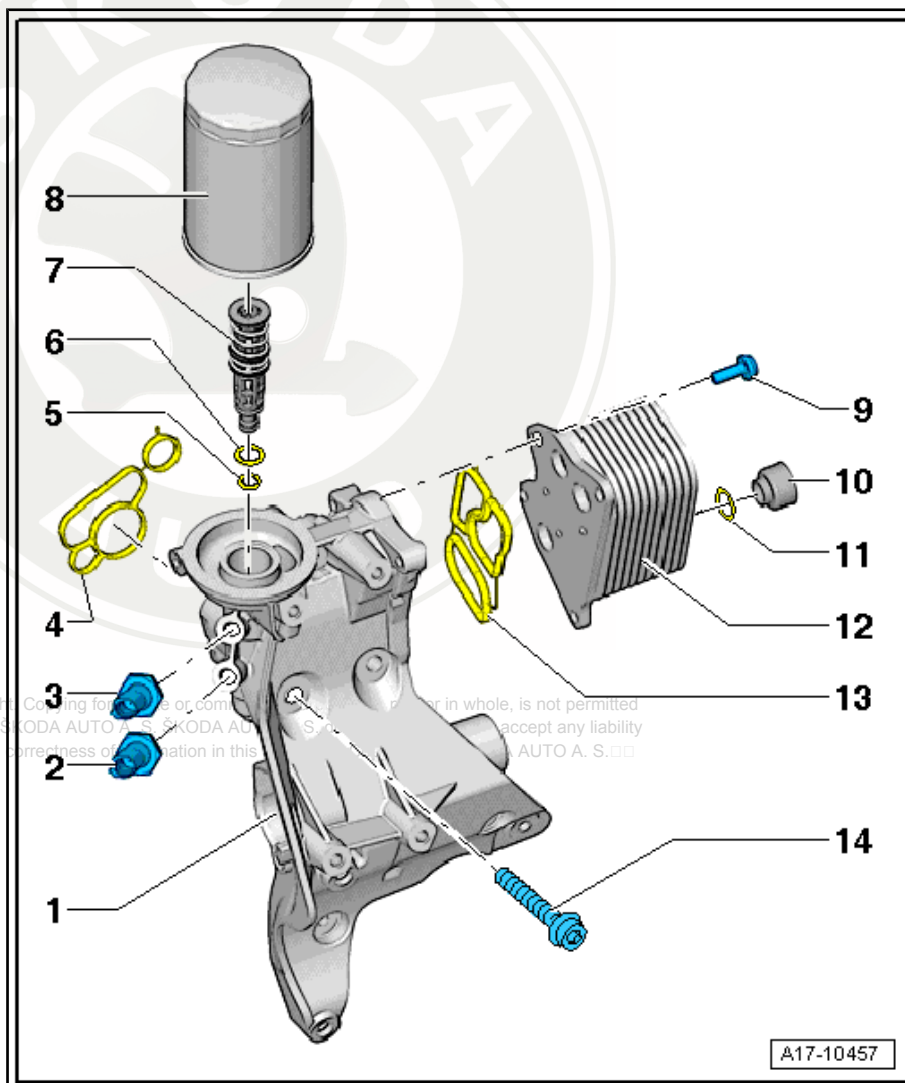
- ☐ one part with valve unit

7 - Valve unit

- ☐ with O-rings

8 - Oil filter

- ☐ removing and installing ➔ Maintenance ; Octavia II
- ☐ removing and installing with oil filter wrench , 22 Nm





9 - 15 Nm

10 - Supports

11 - Sealing ring

- ☐ replace

12 - Engine oil cooler

- ☐ pay attention to the notes ⇒ [page 98](#)
- ☐ ensure clearance to surrounding components
- ☐ connection diagram for coolant hoses ⇒ [page 113](#)
- ☐ removing and installing ⇒ [page 107](#)

13 - Gasket

- ☐ replace

14 - 20 Nm + torque a further 90° (1/4 turn)

- ☐ replace
- ☐ order of tightening ⇒ [page 26](#)

2.2 Removing and installing engine oil cooler

Removing

- Remove the bracket for auxiliary units ⇒ [page 29](#).
- Release screws -4 and 5- and remove engine oil cooler -3- with gasket -2-.

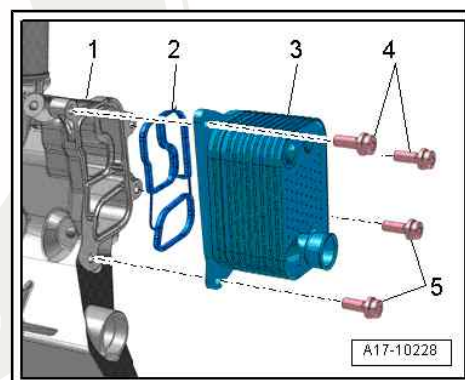
Install

Installation is carried out in the reverse order. Pay attention to the following:



Note

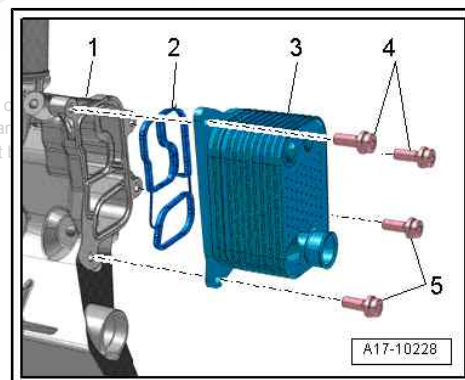
Always replace seals and gasket rings.



- Install engine oil cooler -3- with new gasket -2-.

Tightening torques: ⇒ [page 106](#)

- Install the bracket for auxiliary units ⇒ [page 29](#)



2.3 Testing oil pressure and oil pressure switch

Special tools and workshop equipment required

- ◆ Oil pressure tester , e. g. -V.A.G 1342 -
- ◆ Voltage tester , e. g. -V.A.G 1527 B-



- ♦ Measuring tool set , e.g. -V.A.G 1594 C-
- ♦ Vehicle diagnosis, measurement and information system - VAS 5051-

Conditions

- Engine oil level o.k., test ⇒ Maintenance ; Octavia II .
- Coolant temperature at least 80°C (radiator fan must have run at least once).



Note

Functional test and repair of the visual and acoustic oil pressure display ⇒ Current flow diagrams and Fitting locations, ⇒ Vehicle diagnosis, testing and information system VAS 5051.

2.3.1 Testing oil pressure switch

For engine with identification characters BZB

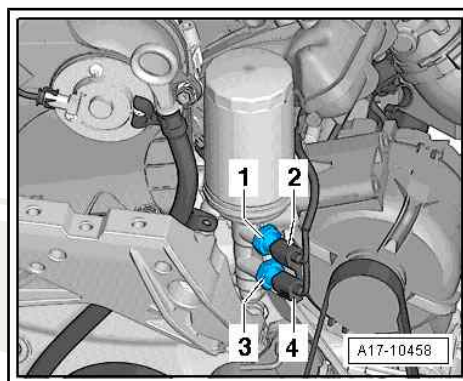
- Remove oil pressure switch -F1- -3- (do not observe Pos. -1-).

For engine with identification characters CDAA, CDAB, CCZA

- Remove oil pressure switch -F22- -3- or oil pressure switch for reduced oil pressure -F378 - -1-.

Continued for all engines

- Screw switch into the test equipment.



- Screw the testing device into the oil filter holder instead of the removed oil pressure switch.
- Connect brown cable of tester to earth (-).
- Connect the voltage tester -V.A.G 1527 B- with auxiliary cables out of the measuring tool set -V.A.G 1594 C- to battery positive (+) and oil pressure switch.
- The LED must not light up.
- If the LED lights up, replace the oil pressure switch .

If the LED does not light up:

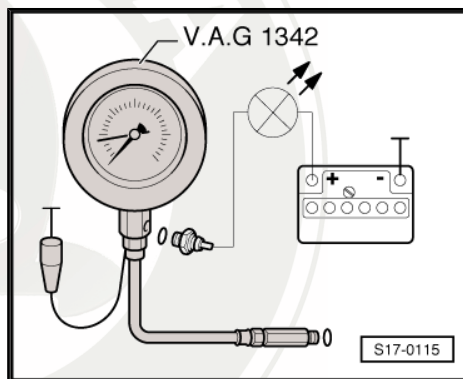
- Start the engine and increase the engine speed.

For engine with identification characters BZB

- The LED must light up at an overpressure of 0.12...0.16 MPa (1.2...1.6 bar), if not replace oil pressure switch.

For engine with identification characters CDAA, CDAB, CCZA

- On the oil pressure switch -F22- the voltage tester must light up at 0.215 - 0.295 MPa (2.15 - 2.95 bar) oil overpressure, otherwise replace the oil pressure switch.
- On the oil pressure switch for reduced oil pressure -F378- the voltage tester must light up at 0.055 - 0.085 MPa (0.55 - 0.85 bar) oil overpressure, otherwise replace the oil pressure switch.





2.3.2 Testing oil pressure

For engine with identification characters BZB

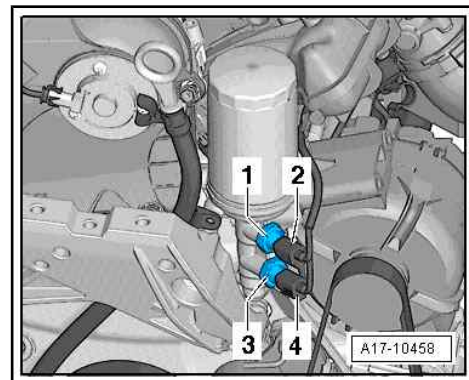
- Remove oil pressure switch -F1- -3- (do not observe Pos. -1-).

For engine with identification characters CDAA, CDAB, CCZA

- Remove oil pressure switch for reduced oil pressure -F378- -1-.

Continued for all engines

- Screw switch into the test equipment.



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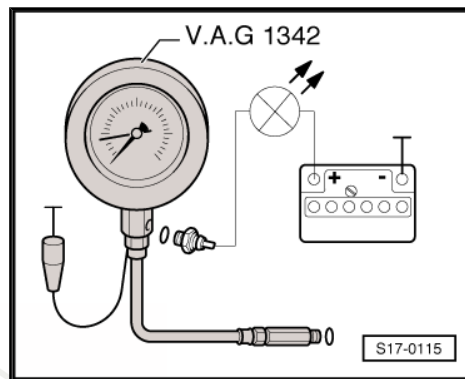
- Screw the testing device into the oil filter holder instead of the removed oil pressure switch.
- Start the engine and increase the engine speed.

For engine with identification characters BZB

- At 2000 rpm the oil overpressure should be 0.27...0.45 MPa (2.7...4.5 bar).
- At a higher engine speed the oil pressure must not be greater than 0.7 MPa (7 bar).

For engine with identification characters CDAA, CDAB, CCZA

- In idle, the oil overpressure should be 0.12...0.21 MPa (1.2...2.1 bar).
- At 2000 rpm the oil overpressure should be 0.16...0.21 MPa (1.6...2.1 bar).
- At 3700 rpm the oil overpressure should be 0.30...0.40 MPa (3.0...4.0 bar).



Note

If the engine is new, the oil pressure can be between 0.30...0.40 MPa (3.0...4.0 bar) during the first 1000 km at 2000 rpm.

Continued for all engines

If the specified value is not reached:

- Check the strainer in the suction line for contamination.



Note

Also mechanical damage, e.g. bearing damage can be the cause of a too low oil pressure.

If no fault is found:

- Replace oil pump ⇒ [page 101](#).

If the specified pressure is exceeded:

- Replace oil pump ⇒ [page 101](#).



Note

Before installing the new oil pump, check the oil ducts in the upper part of the oil pan for contamination.



19 – Cooling

1 Cooling system



WARNING

Hot steam may escape when the coolant expansion reservoir is opened. Wear safety goggles and safety clothing, in order to avoid eye injuries and scalding. Cover the cap with a cloth and open carefully.



Note

- ◆ *When the engine is warm the cooling system is under pressure. If necessary reduce pressure before repairs.*
- ◆ *The hose connections are secured with spring-type clips. In the event of repairs only use spring-type clips → electronic catalogue of original parts .*
- ◆ *Use pliers for spring strap clamps to fit the spring strap clips.*
- ◆ *Always replace seals and gasket rings.*
- ◆ *When installing fit the coolant hoses free of stress, without them touching any other components (pay attention to the marking on the coolant connection).*
- ◆ *The arrows which are on the coolant pipes and the coolant hose ends must stand opposite to each other.*

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1.1 Parts of cooling system on the side next to the body - Summary of components

1 - Top coolant hose

- ☐ to the coolant pump

2 - O-ring

- ☐ replace if damaged

3 - Radiator

- ☐ removing and installing
⇒ [page 136](#)
- ☐ after replacing fill entire system with fresh coolant

4 - Gasket

5 - Screw cap

- ☐ Testing the pressure relief valve in the cap
⇒ [page 137](#)

6 - Connector

7 - 3 Nm

8 - Expansion reservoir

- ☐ with coolant shortage warning light sender - G32-
- ☐ Check the cooling system for tightness
⇒ [page 137](#)

9 - 5 Nm

10 - 10 Nm

11 - Right radiator fan -V35-

- ☐ removing and installing
⇒ [page 135](#)

12 - Radiator fan -V7-

- ☐ removing and installing ⇒ [page 135](#)
- ☐ with radiator fan control unit -J293-

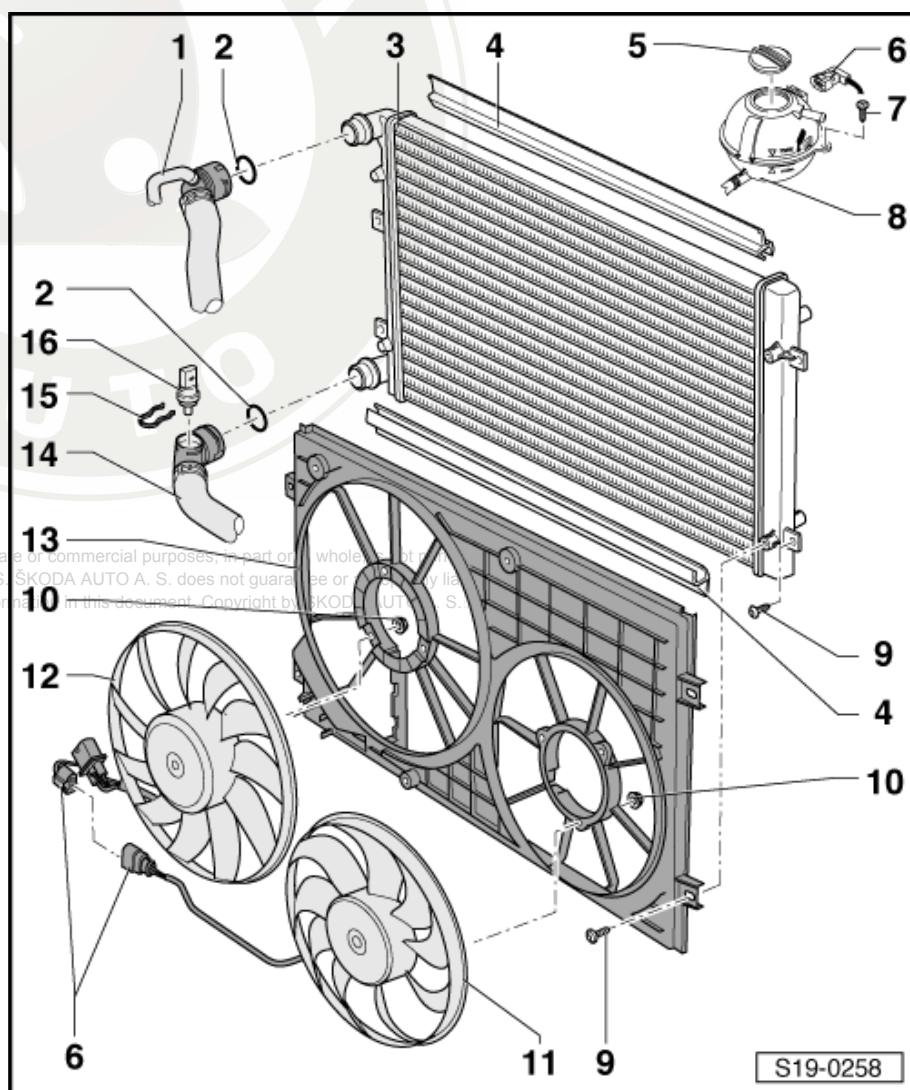
13 - Fan shroud

14 - Bottom coolant hose

- ☐ to coolant thermostat

15 - Retaining clip

16 - Coolant temperature sender at radiator outlet -G83-

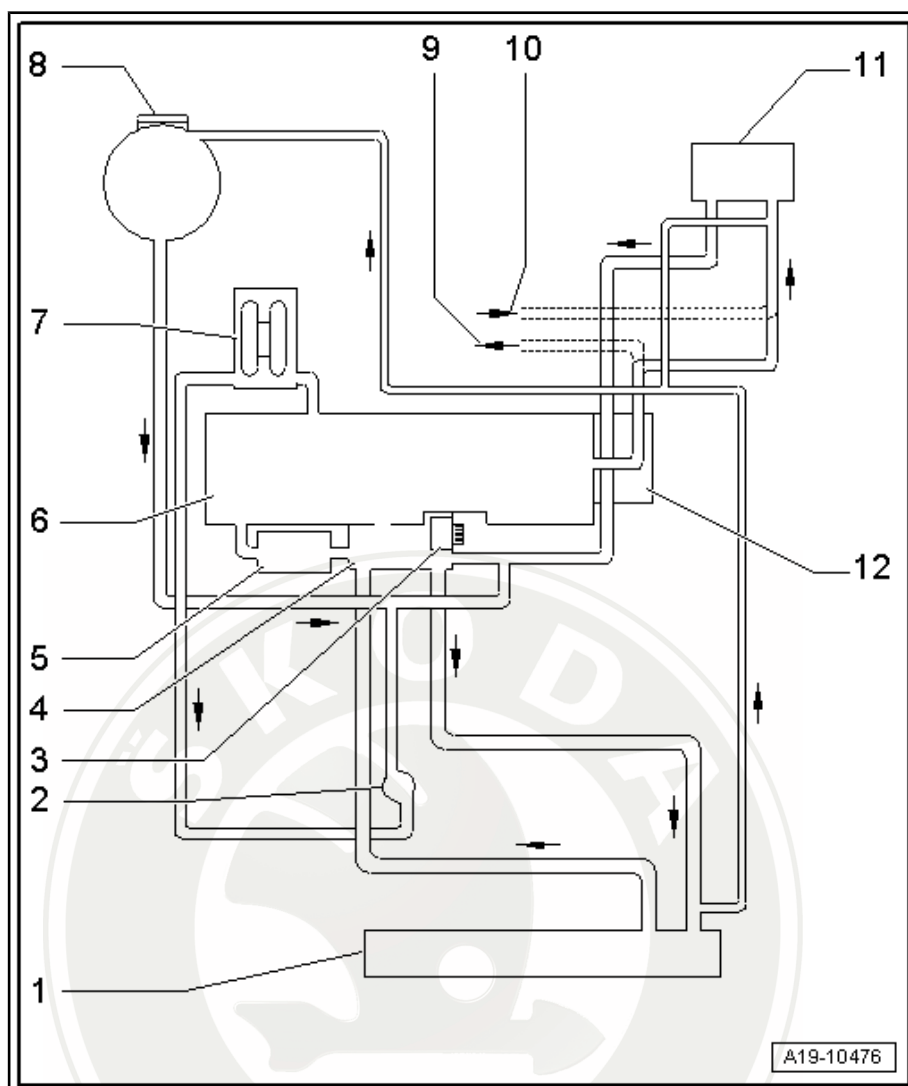




1.2 Connection diagram for coolant hoses

For vehicles with manual gearbox

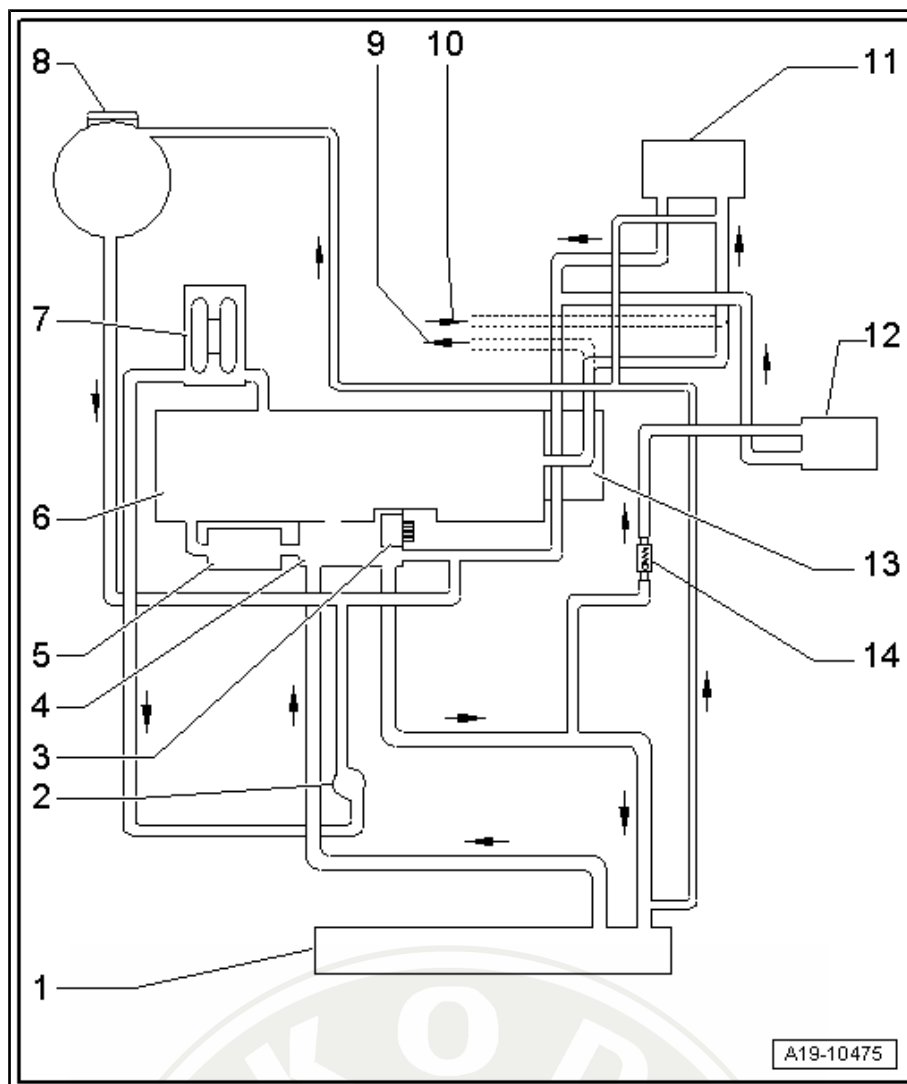
- 1 - Radiator
- 2 - Pump for coolant after-running -V51-
- 3 - Coolant pump
- 4 - Coolant regulator
- 5 - Engine oil cooler
- 6 - Cylinder head and cylinder block
- 7 - Exhaust gas turbocharger
- 8 - Expansion reservoir
- 9 - to auxiliary heating
- 10 - from the auxiliary heating
- 11 - Heat exchanger
- 12 - Coolant fitting



For vehicles with automatic gearbox DSG

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- 1 - Radiator
- 2 - Pump for coolant after-running -V51-
- 3 - Coolant pump
- 4 - Coolant regulator
- 5 - Engine oil cooler
- 6 - Cylinder head and cylinder block
- 7 - Exhaust gas turbocharger
- 8 - Expansion reservoir
- 9 - to auxiliary heating
- 10 - from the auxiliary heating
- 11 - Heat exchanger
- 12 - Gearbox oil cooler
- 13 - Coolant fitting
- 14 - Regulator for gearbox oil cooler



1.3 Draining and filling up coolant

Special tools and workshop equipment required

- ◆ Catch pan e.g. -VAS 6208-
- ◆ Pliers for spring strap clamps
- ◆ Refractometer -T10007-

Draining



Note

- ◆ *Collect drained coolant in a clean container for reuse or proper disposal.*
- ◆ *Please observe the disposal instructions.*

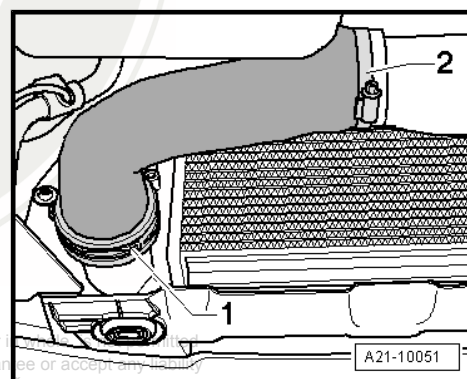
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WARNING

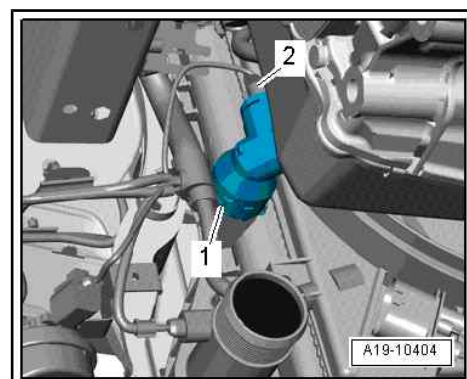
Hot steam may escape when the coolant expansion reservoir is opened. Wear safety goggles and safety clothing, in order to avoid eye injuries and scalding. Cover the cap with a cloth and open carefully.

- Open the cap of the expansion reservoir.
- Remove the sound dampening system ⇒ Body Work ⇒ Rep. Gr. 50 .
- Place a catch pan under the radiator.
- Slacken clamps -1 and 2- and remove charge air hose.



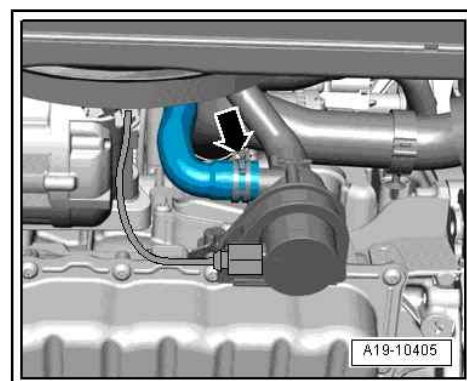
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- Remove support for coolant -1- at bottom of radiator and drain coolant.



- Remove bottom coolant hose -arrow- to pump for coolant after-running -V51- and drain coolant.

Vehicles with auxiliary heating.



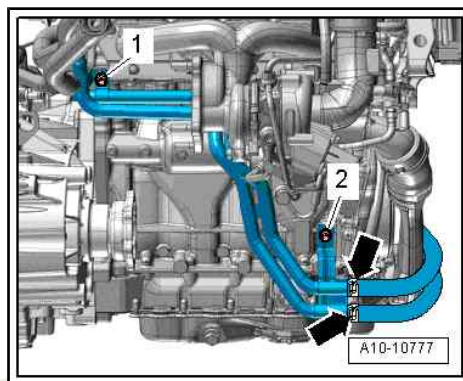


- Remove coolant hoses -arrows- and drain residual coolant.

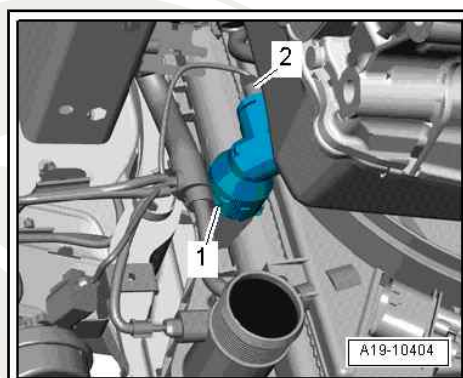
Filling up

Select the appropriate coolant additive from the ⇒ Electronic Catalogue of Original Parts or from the list of allowed coolant additives ⇒ Maintenance ; Octavia II .

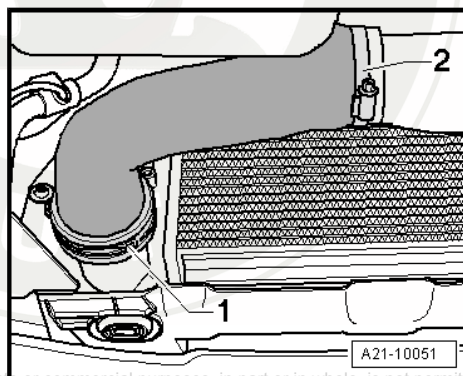
- In a clean reservoir mix drinking water and antifreeze agent in the specified mixing ratio ⇒ Maintenance ; Octavia II .



- Install support for coolant -1- at bottom of radiator.

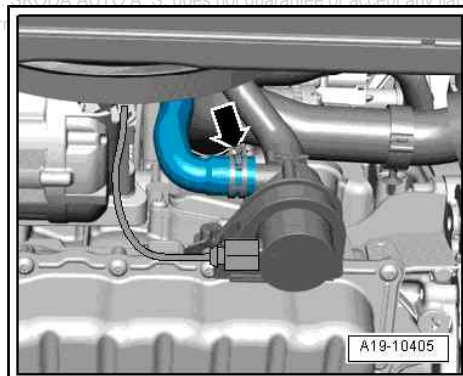


- Install charge air hose and secure with clamps -1 and 2-.



- Fit bottom coolant hose -arrow- onto the pump for coolant after-running -V51- and secure with spring strap clamp.

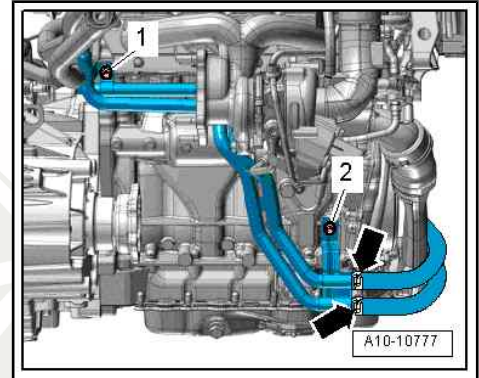
Vehicles with auxiliary heating.



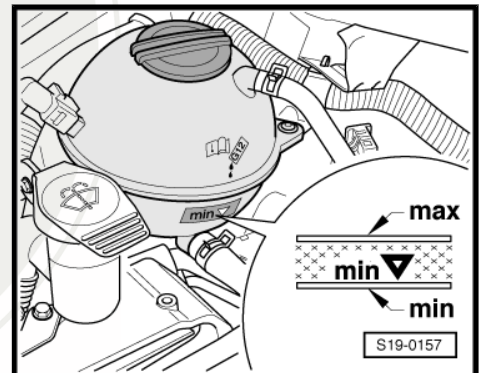


- Fit on coolant hoses -arrows- and secure with spring strap clamps.

Continued for all vehicles



- Fill up the coolant slowly up to the top marking of the criss-crossed field (max.) on the expansion reservoir.
- Seal expansion reservoir.
- Switch off the heating and air-conditioning system.
- Start the engine and maintain the engine speed for about 3 minutes at approx. 2000 r.p.m.
- Run engine until radiator fan -V7- starts.

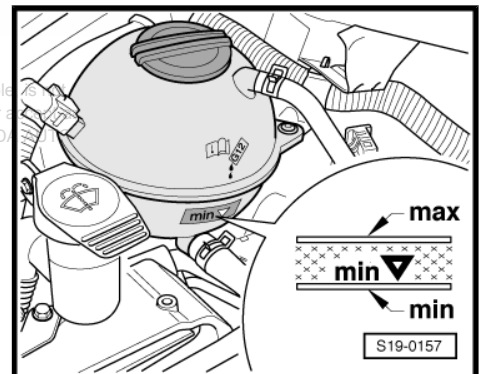


- Check coolant level when the expansion reservoir is closed.
- When engine is at operating temperature the coolant level must be at the max. marking, when engine is cold between the min. and the max. markings.



WARNING

Hot steam may escape when the compensation bottle is opened. Wear safety goggles and safety clothing, in order to avoid eye injuries and scalding. Cover the cap with a cloth and open carefully.

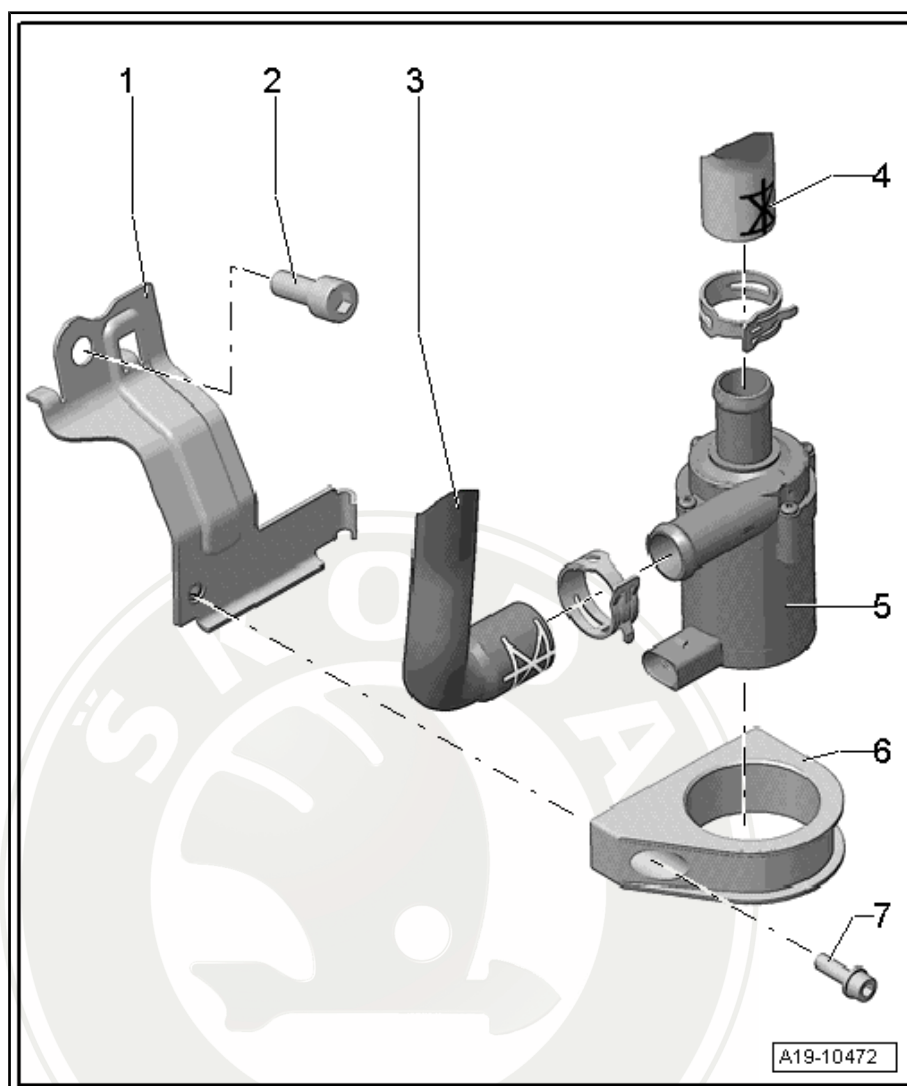


- If necessary, top up with coolant.

2 Pumps, coolant regulators, coolant pipes

2.1 Coolant after-running pump -V51- - Summary of components

- 1 - Support
- 2 - 40 Nm
- 3 - Coolant hose
- 4 - Coolant hose
- 5 - Pump for coolant after-running -V51-
- 6 - Support
- 7 - 8 Nm



2.2 Removing and installing coolant after-running pump -V51-

Special tools and workshop equipment required

- ◆ Hose clamps up to 25 mm -MP7-602 (3094)-
- ◆ Pliers for spring strap clamps
- ◆ Catch pan e.g. -VAS 6208 -

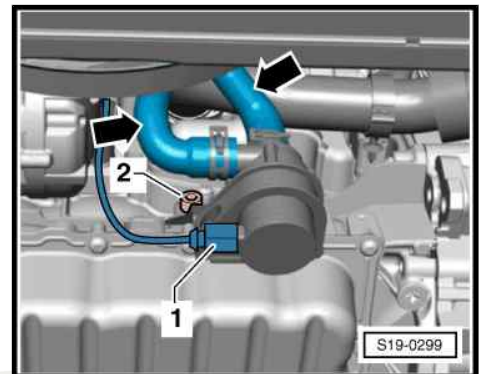
Removing



WARNING

Hot steam may escape when the coolant expansion reservoir is opened. Wear safety goggles and safety clothing, in order to avoid eye injuries and scalding. Cover the cap with a cloth and open carefully.

- Open the cap of the expansion reservoir.
- Remove the sound dampening system ⇒ Body Work ⇒ Rep. Gr. 50 .
- Disconnect the plug -1- from the pump for coolant after-running -V51- .
- Place a catch pan under the engine.
- Disconnect coolant hoses -arrows- with hose clamps - MP7-602- .
- Remove coolant hoses from the coolant after-running pump - V51- .
- Release screw -2- and remove coolant after-running pump - V51- .



Install

Installation is carried out in the reverse order. Pay attention to the following:

- ◆ Tightening torque: ⇒ [page 118](#)
- Top up with coolant ⇒ [page 114](#) .

2.3 Coolant pipes - Summary of components

1 - Front coolant pipes

- ☐ removing and installing
⇒ [page 120](#)

2 - Coolant hose

- ☐ from exhaust turbo-charger

3 - Coolant hose

- ☐ to the expansion reservoir

4 - 5 Nm

5 - O-ring

- ☐ replace

6 - Coolant hose

- ☐ to heat exchanger

7 - Small coolant pipe

- ☐ removing and installing
⇒ [page 122](#)

8 - 9 Nm

9 - Coolant hose

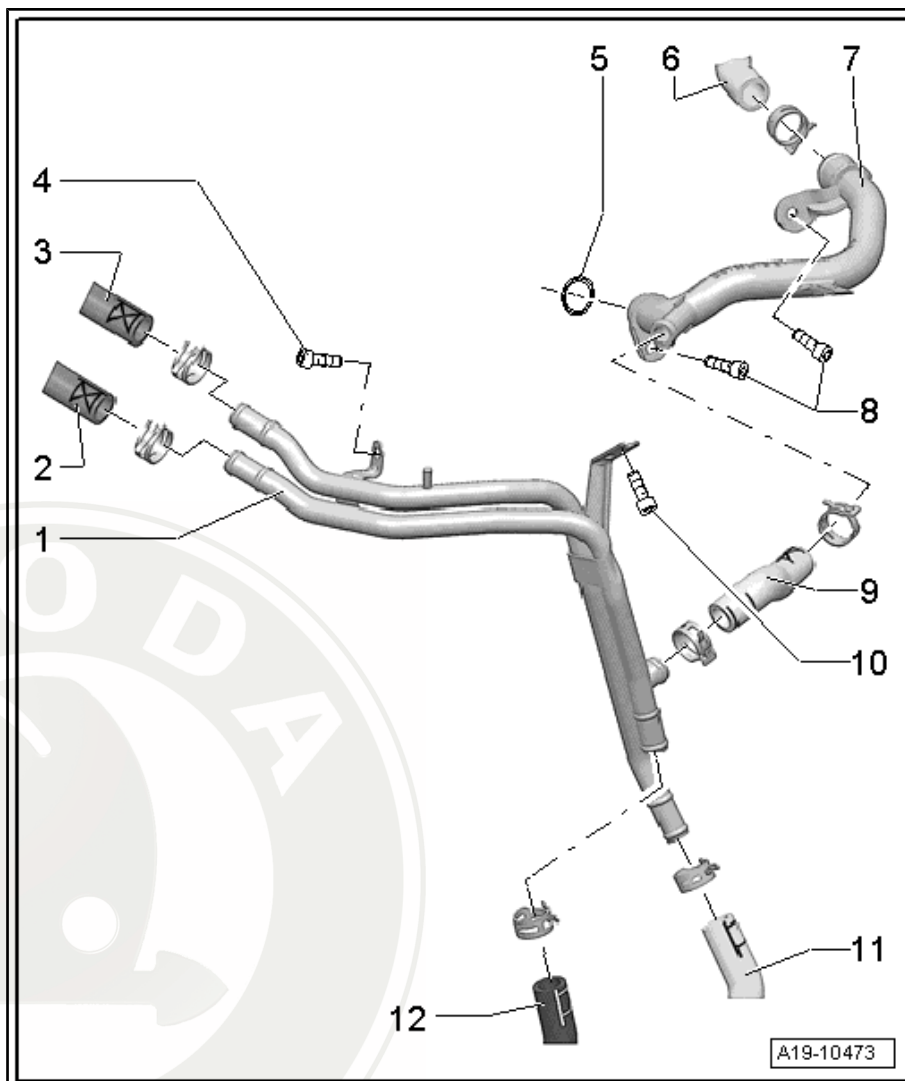
10 - 5 Nm

11 - Coolant hose

- ☐ from the coolant after-running pump -V51-

12 - Coolant hose

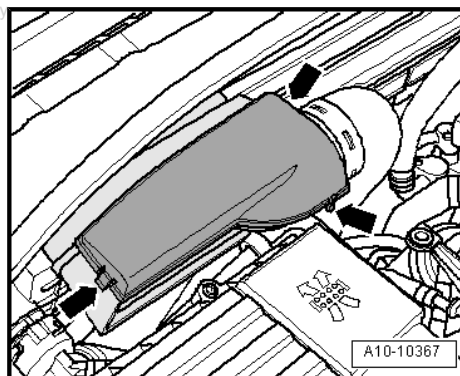
- ☐ to pump for coolant after-running -V51 -



2.4 Removing and installing the front coolant pipes

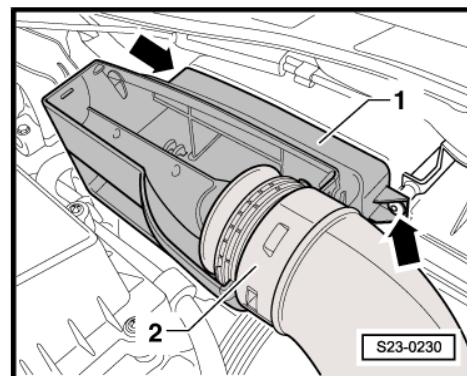
Removing

- Drain coolant ⇒ [page 114](#).
- Remove cover for air intake pipe, to do so release lateral retaining clasps -arrows-.

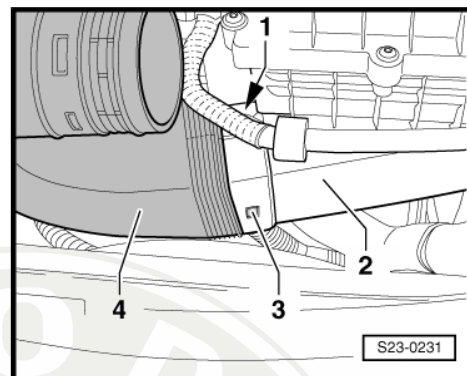




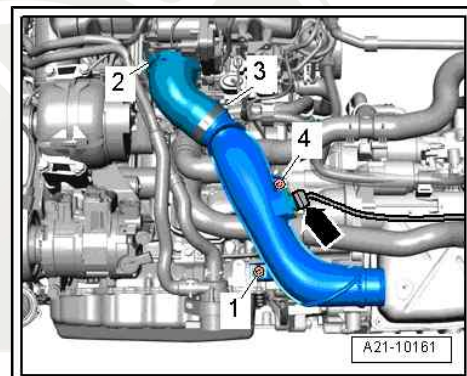
- Release screws -arrows- for the air intake connection -1- and take connecting hose -2- out of the guide.



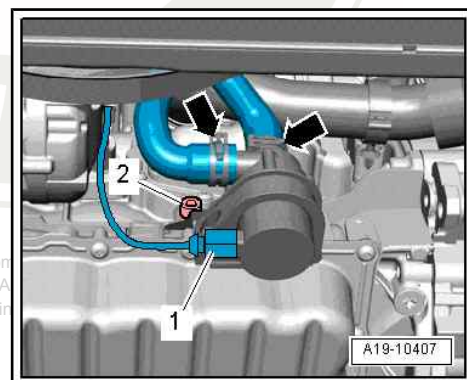
- Press in catches -1- and -3- and pull off connecting hose -4- from air filter -2-.



- Loosen clamp -2-.
- Disconnect plug -arrow- from charge pressure sender -G31-.
- Unscrew screws -1- and -4- and remove the charge air pipe with the hose to the bottom.

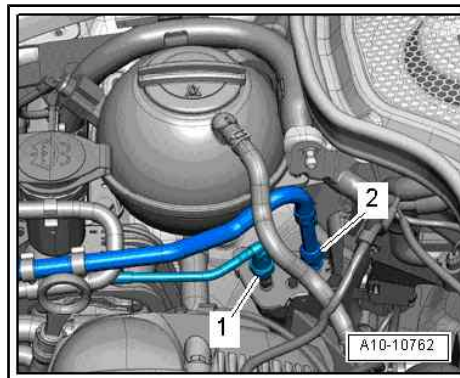


- Remove coolant hoses from the coolant after-running pump -V51- -arrows-.

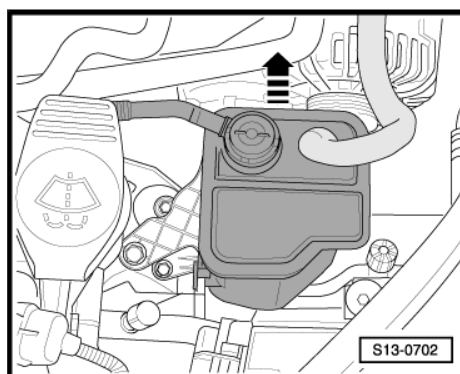


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- Disconnect the vent line -1- (press in the securing ring).
- Unhook vent line at the coolant pipes.
- Slacken the terminal on the rear side of the activated charcoal reservoir.



- Detach reservoir with its connected hoses upwards from the bracket -arrow- and lay to the side.

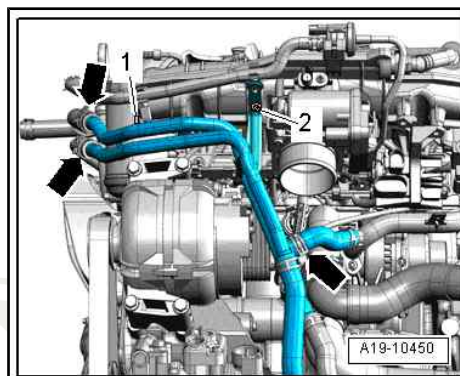


- Release screws -1 and 2- and remove the coolant pipes from the coolant hoses -arrows-.

Install

Installation is carried out in the reverse order. Pay attention to the following:

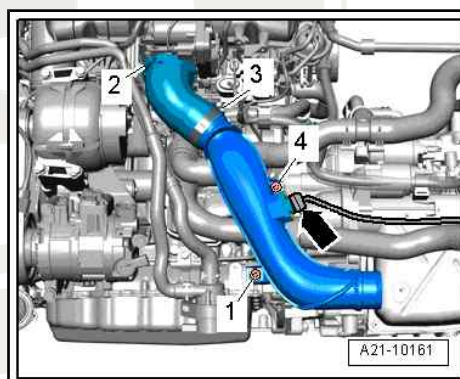
- ♦ Tightening torques: ➔ [page 120](#)
- Top up coolant ➔ [page 114](#) .



2.5 Removing and installing the small coolant pipe

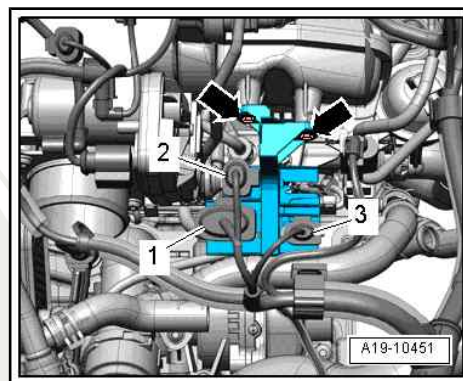
Removing

- Drain coolant ➔ [page 114](#) .
- Remove the air filter housing ➔ [page 218](#) .
- Loosen clamp -2-.
- Disconnect plug -arrow- from charge pressure sender -G31- .
- Unscrew screws -1- and -4- and remove the charge air pipe with the hose to the bottom.





- Release screws -arrows- and remove plug connections -1 to 3- from the holder.

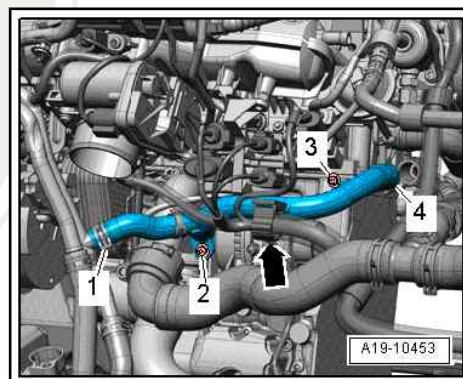


- Expose cable harness at small coolant pipe -arrow-.
- Release screws -2 and 3-.
- Detach small coolant pipe from the coolant pump and from the hoses -1 and 4-.

Install

Installation is carried out in the reverse order. Pay attention to the following:

- ♦ Tightening torques: ⇒ [page 120](#)
- Top up coolant ⇒ [page 114](#) .



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2.6 The coolant pump and coolant regulator - List of assembly parts

1 - 9 Nm

2 - O-rings

☐ replace

3 - Connecting support

4 - Clip

☐ only connected version
☐ pay attention to correct position

5 - 4 Nm

☐ only bolted version

6 - Retaining plate

☐ only bolted version

7 - Coolant temperature sender -G62-

☐ replace ⇒ [page 125](#)

8 - O-ring

☐ replace

9 - Coolant pump

☐ removing and installing
⇒ [page 129](#)
☐ on new coolant pump
remove the protective
cap

10 - Gasket

☐ replace

11 - Centering pin

☐ 2 pieces

12 - Toothed belt for coolant
pump

☐ removing and installing ⇒ [page 126](#)

13 - Toothed belt guard

14 - 9 Nm

15 - 10 Nm + torque a further 90° (1/4 turn)

☐ replace
☐ Left-hand thread

16 - Drive wheel for toothed belt

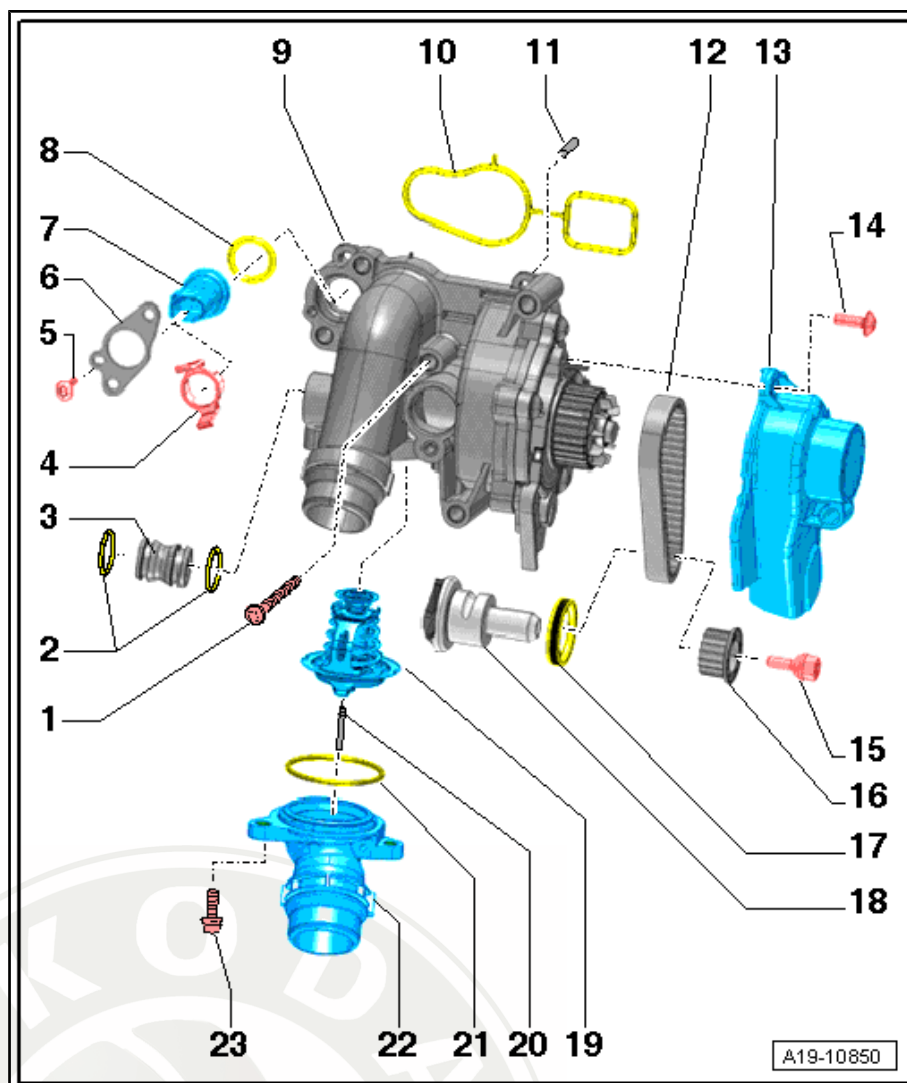
17 - Radial sealing ring

☐ replace ⇒ [page 128](#)

18 - Balancing shaft

19 - Coolant regulator

☐ removing and installing ⇒ [page 131](#)
☐ The coolant regulator can be checked via the "Targeted fault finding" under "Selected Functions/Components" ⇒ Vehicle diagnosis, testing and information system VAS 5051
☐ Opening start of coolant regulator: approx. 87°C
☐ Opening end of coolant regulator: approx. 105°C





- ☐ Opening stroke: approx. 8 mm

20 - Fit pin

21 - O-ring

- ☐ replace

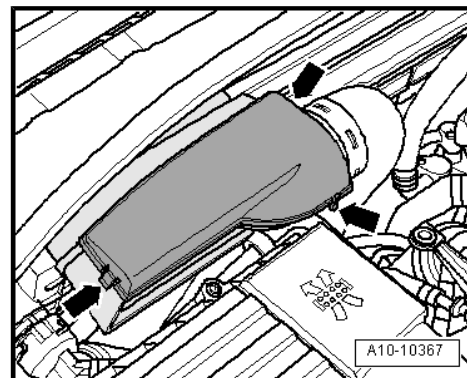
22 - Connection fittings

23 - 9 Nm

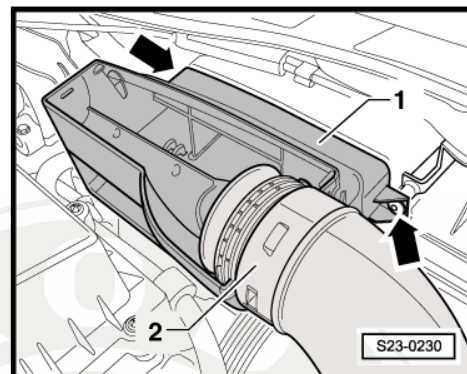
2.7 Replace coolant temperature sender - G62-

Removing

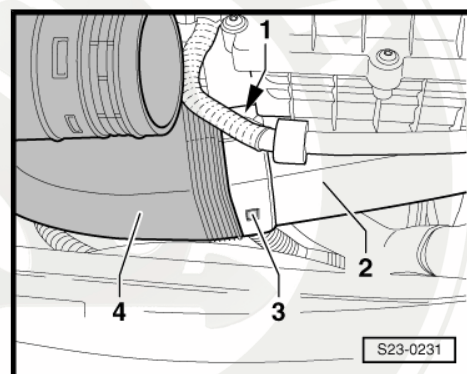
- Remove cover for air intake pipe, to do so release lateral retaining clasps -arrows-.



- Release screws -arrows- for the air intake connection -1- and take connecting hose -2- out of the guide.



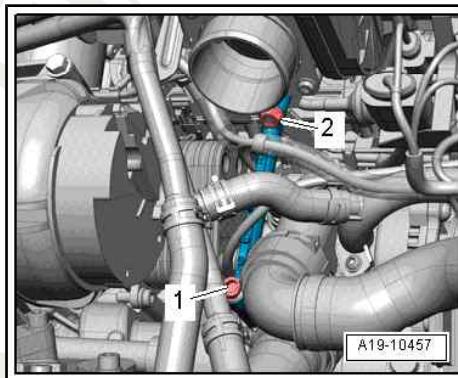
- Press in catches -1- and -3- and pull off connecting hose -4- from air filter -2-.
- Remove throttle valve control unit -J338- → [page 215](#).





- Remove support for intake manifold, to do so release nut -2- with screw -1-.

Coolant temperature sender -G62- with clamp:



- Disconnect plug -1- at the coolant temperature sender -G62- .
- Pull off retaining clip, to do so press locks -arrows-.
- Pull out coolant temperature sender -G62- -2-.

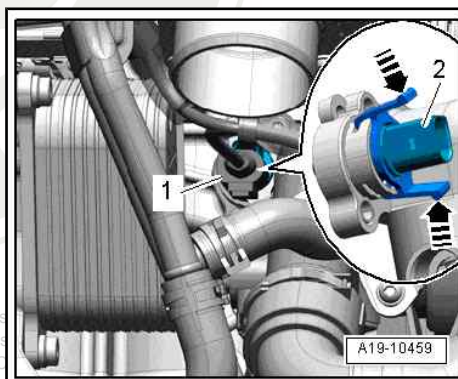


Note

In order to avoid a loss of large amount of coolant, immediately insert new coolant temperature sender -G62- with O-ring into the connection fitting.

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Coolant temperature sender -G62- with retaining plate:

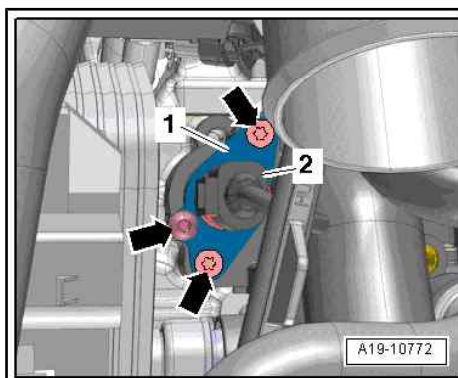


- Disconnect plug -2- at the coolant temperature sender -G62- .
- Screw out screws -arrows- and remove the retaining plate -1-.
- Pull out the coolant temperature sender -G62- .



Note

In order to avoid a loss of large amount of coolant, immediately insert new coolant temperature sender -G62- with O-ring into the connection fitting.



Install

Installation is performed in the reverse order, pay attention to the following points:



Note

Replace O-ring.

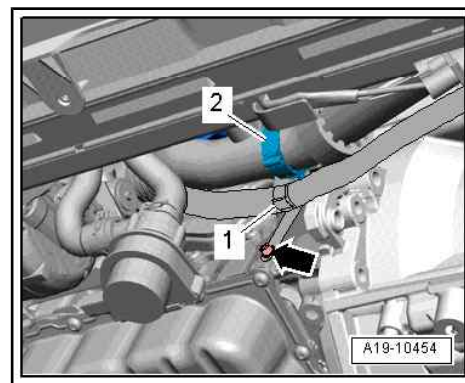
- ♦ Tightening torques for support of intake manifold and throttle valve control unit -J338- : ➔ [page 203](#)
- Check the coolant level after carrying out the work procedure ➔ Maintenance ; Octavia II .

2.8 Removing and installing timing belt for coolant pump

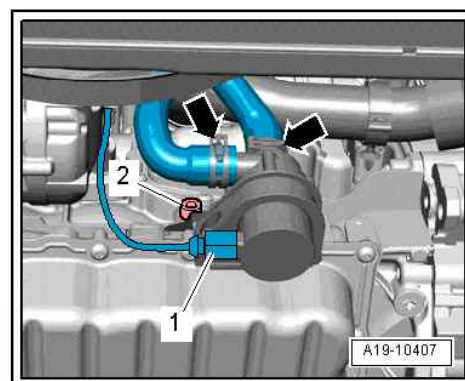
Removing

- Remove small coolant pipe ➔ [page 122](#) .

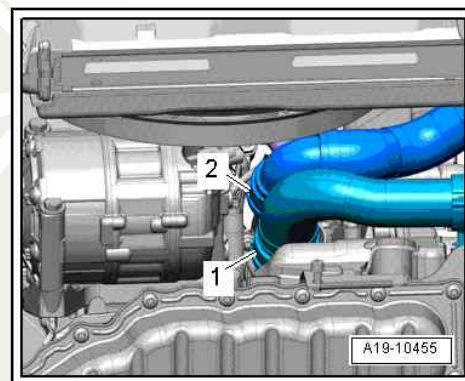
- Slacken coolant hose -2- and cable harness -1-.
- Unscrew screw -arrow- and remove bracket.



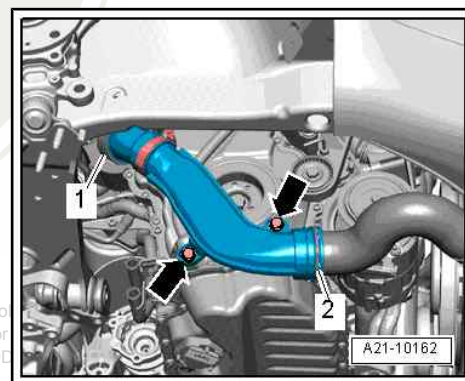
- Unscrew screw -2- at bracket for pump for coolant after-running -V51-.



- Remove coolant hoses -1 and 2- and lay to the side.
- Remove the front right wheelhouse liner ⇒ Body Work; Rep. Gr. 66.



- Screw out screws -arrows-.
- Remove charge-air pipe. To do so lift terminals -1 and 2-.



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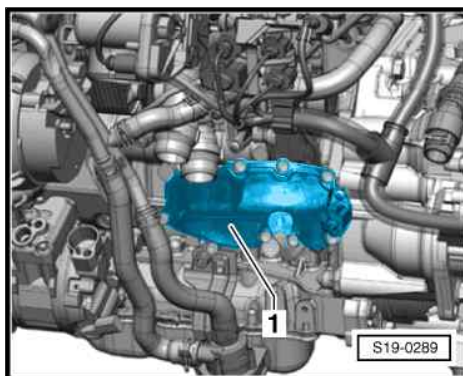
- Unscrew oil scraper -1-.



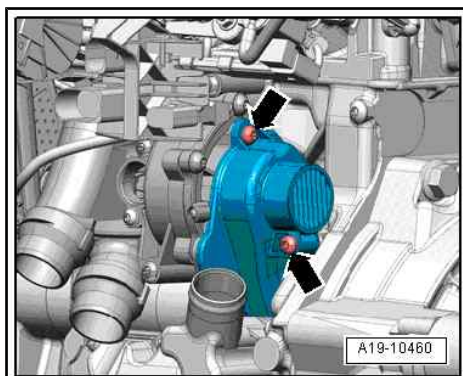
Caution

Risk of contamination to the lubrication system.

- ◆ *Cover the opening for the oil with a clean cloth.*



- Screw out screws -arrows- and remove timing belt guard.



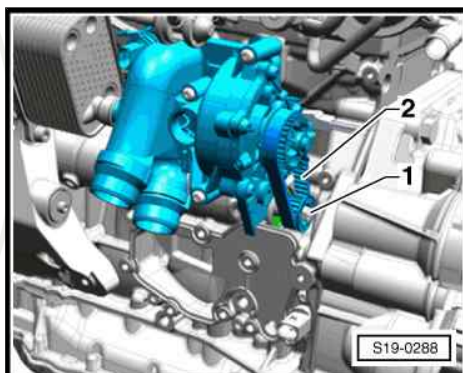
- Unscrew screw -1- at drive wheel for coolant pump, to do so counterhold vibration damper.



Caution

The screw at the drive wheel has a left-hand thread.

- Remove drive wheel -1- and toothed belt -2-.



Install

Installation is carried out in the reverse order. Pay attention to the following:

- ◆ Tightening torques: ➔ [page 124](#)



Note

- ◆ *Replace screw for drive wheel:* commercial purposes, in part or in whole, is not permitted unless authorised by SKODA AUTO A. S. SKODA AUTO A. S. does not guarantee or accept any liability
- ◆ *Pay attention to the fitting location of the toothed belt sprocket* ➔ [page 124](#).
- ◆ *Replace O-rings and gaskets.*

- Install oil scraper ➔ [page 98](#).
- Install pump for coolant after-running -V51- ➔ [page 118](#).
- Install small coolant pipe ➔ [page 122](#).

2.9 Replacing radial sealing ring for coolant pump drive

Special tools and workshop equipment required

- ◆ Thrust piece -T10353-

- ◆ Cleaning and degreasing agent , e.g. -D 000 401 04-

Work procedure

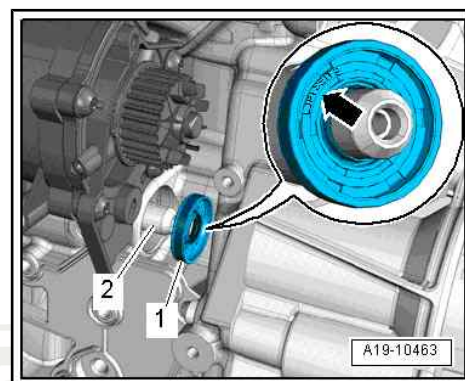
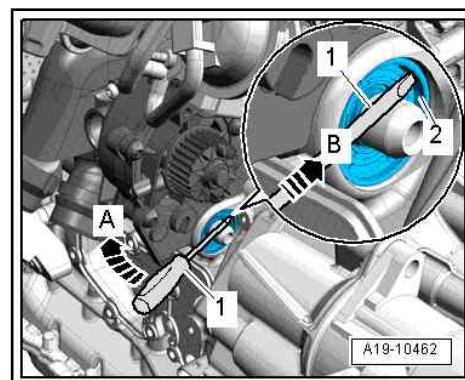
- Remove toothed belt of coolant pump ⇒ [page 126](#) .
- Insert screwdriver -1- firmly onto the surface -2- of the gasket ring -arrow B-.
- Lever out gasket ring -arrow A-.



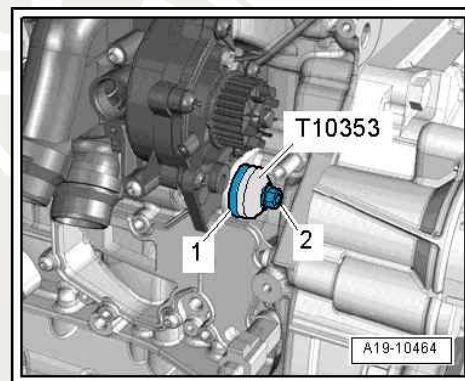
WARNING

Wear protective gloves when working with sealant and grease remover!

- Carefully clean the balancing shaft and the gasket ring seat. They must be free of oil and grease.
- Push gasket ring -1- onto the balancing shaft.
- The legend “Air side” or (“Outside”) -arrow- must be legible from above.



- Position the pressure plate -T10353- onto the gasket ring -1- and press in up to the stop by means of the screw -2-, do not tilt the gasket ring during this process.
- Install toothed belt of coolant pump ⇒ [page 126](#) .

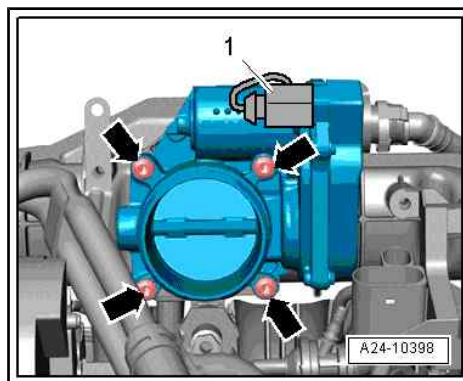


2.10 Removing and installing coolant pump

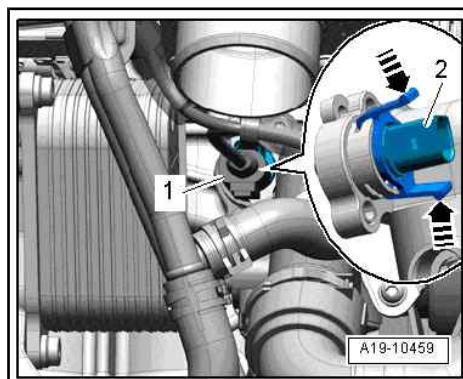
Removing

- Remove toothed belt of coolant pump ⇒ [page 126](#) .

- Disconnect the plug -1- at the throttle valve control unit -J338-
- Release screws -arrows- and remove throttle valve control unit -J338-.



- Disconnect plug -1- at the coolant temperature sender -G62-.



- Release screws -1 through 5-.
- Remove coolant pump from centering pins and pull off from engine oil cooler.

Install

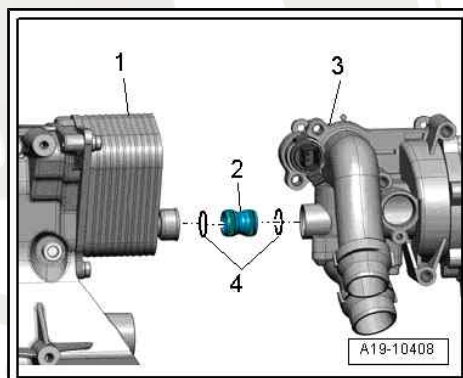
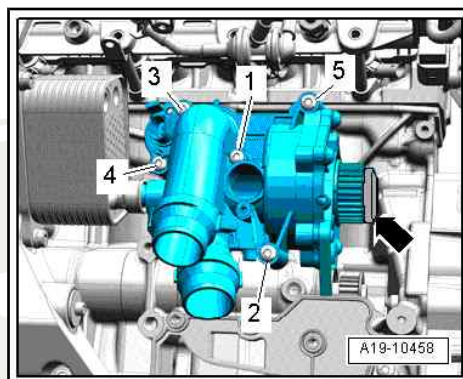
Installation is carried out in the reverse order. Pay attention to the following:



Note

Replace O-rings and gaskets.

- Moisten O-rings -4- with coolant.
- Check whether both centering pins have been inserted in the cylinder block, if necessary insert.
- Insert connecting piece -2- into the engine oil cooler -1-.
- Position coolant pump -3- onto the connection piece and push the centering pins into the cylinder block.

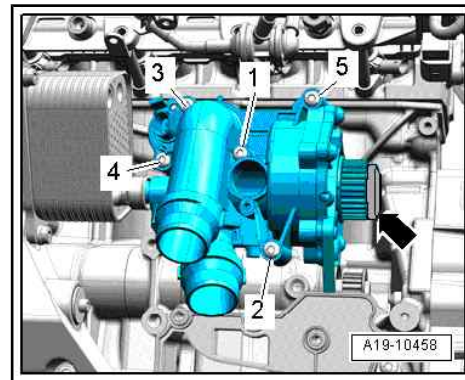


- Tighten screws -1 to 5- in the sequence to 9 Nm according to the figure.

**Note**

When installing a new coolant pump, remove the protective cap -arrow-.

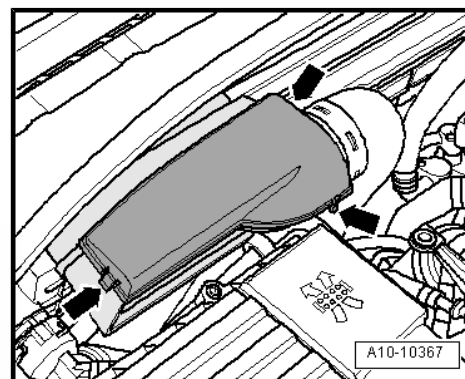
- Install toothed belt of coolant pump ⇒ [page 126](#) .



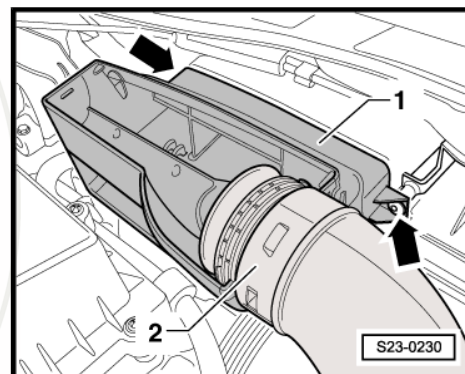
2.11 Removing and installing coolant regulator

Removing

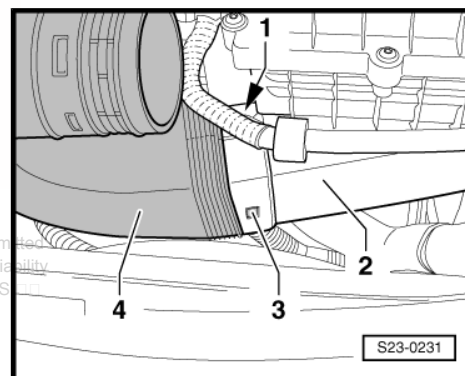
- Drain coolant ⇒ [page 114](#) .
- Remove cover for air intake pipe, to do so release lateral retaining clasps -arrows-.



- Release screws -arrows- for the air intake connection -1- and take connecting hose -2- out of the guide.

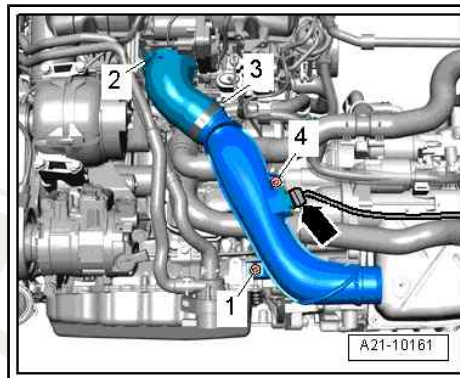


- Press in catches -1- and -3- and pull off connecting hose -4- from air filter -2-.

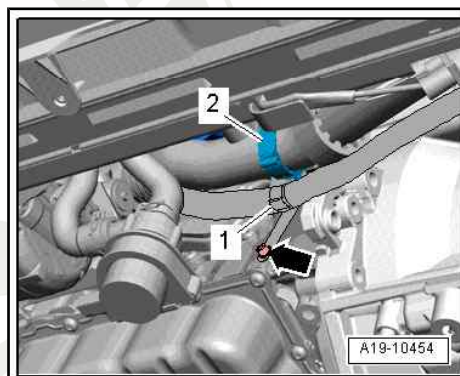


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- Loosen clamp -2-.
- Disconnect plug -arrow- from charge pressure sender -G31-.
- Unscrew screws -1- and -4- and remove the charge air pipe with the hose to the bottom.



- Slacken coolant hose -2- and cable harness -1-.
- Unscrew screw -arrow- and remove bracket.

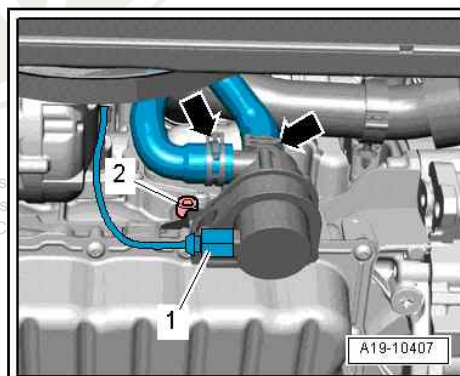


- Unscrew screw -2- at bracket for pump for coolant after-running -V51-.

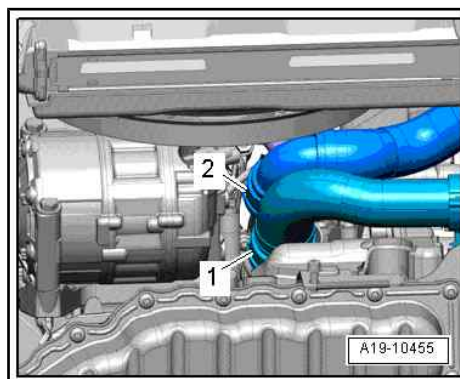


Note

The pump for coolant after-running -V51- remains in the fitting position.



- Remove coolant hoses -1 and 2- and lay to the side.



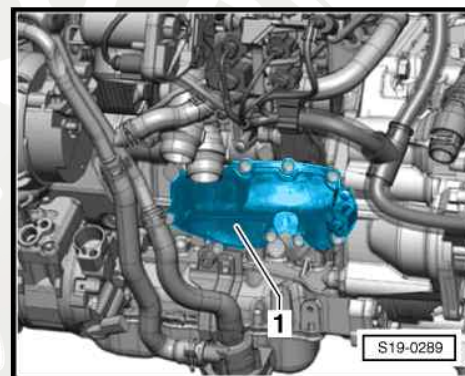
- Unscrew oil scraper -1-.



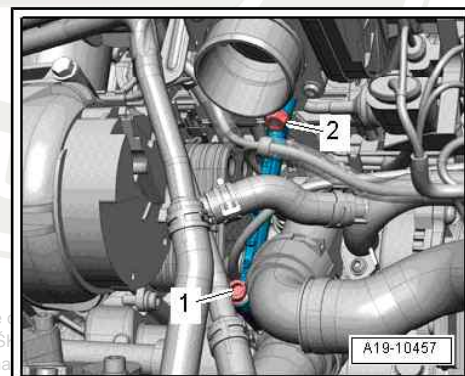
Caution

Risk of contamination to the lubrication system.

- ◆ *Cover the opening for the oil with a clean cloth.*



- Slacken nut -2-, release screw -1- and swivel support for intake manifold slightly towards the right.



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- Screw out screws -arrows- and remove connection fittings.
- Detach coolant regulator.

Install

Installation is carried out in the reverse order. Pay attention to the following:

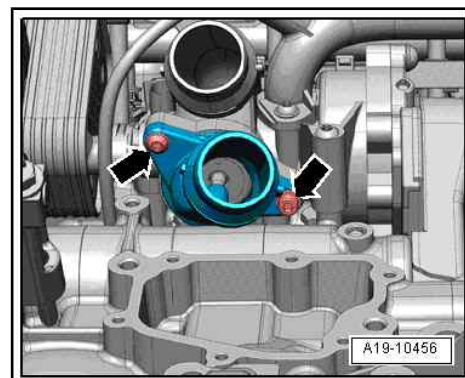
- ◆ Tightening torques: ⇒ [page 124](#) .



Note

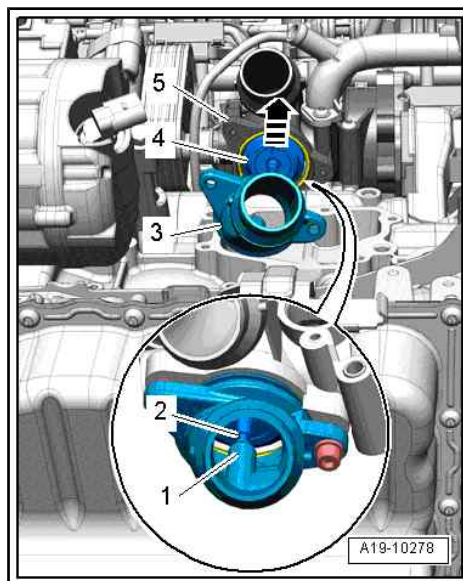
Replace O-rings and gaskets.

- Clean sealing surface for O-ring.
- Moisten O-ring with coolant.

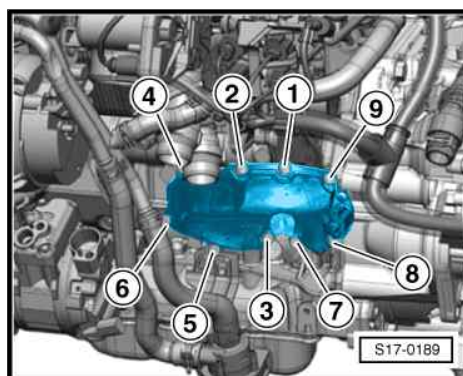




- Insert coolant regulator -4- into the housing -5- for coolant pump and swivel slightly forward -arrow-.
- Carefully position support -3-, to do so guide dowel pin -2- into the guide -1-.
- Screw connection fitting.



- Replace the gasket at the oil scraper and tighten the screws in the sequence -1 to 9- to 9 Nm.
- Install support for intake manifold ➔ [page 203](#) .
- Install pump for coolant after-running -V51- ➔ [page 118](#) .
- Top up coolant ➔ [page 114](#) .

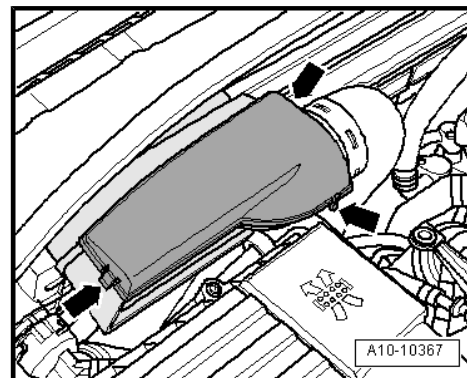


3 Radiator and radiator fan

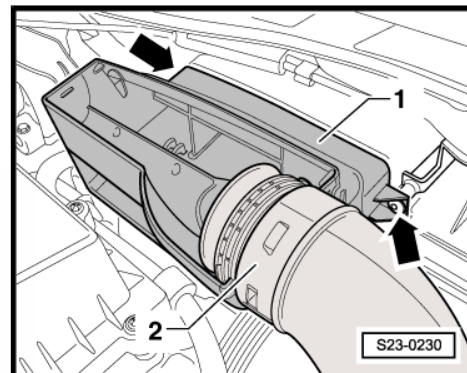
3.1 Removing and installing fan shroud for radiator fan -V7- and -V35-

Removing

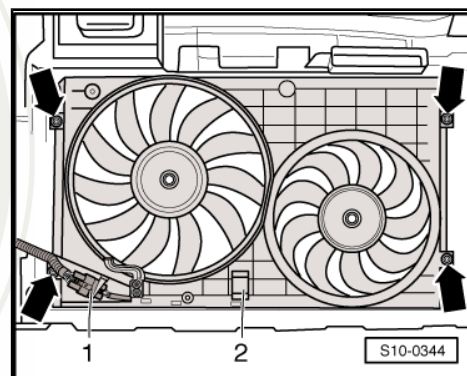
- Remove cover for air intake pipe, to do so release lateral retaining clasps -arrows-.



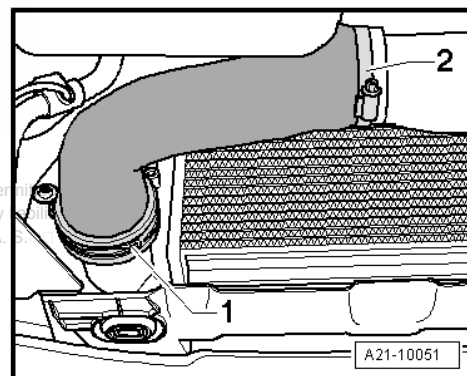
- Release screws -arrows- for the air intake connection -1- and take connecting hose -2- out of the guide.



- Unscrew the top fixing screws -top arrows- of the fan shroud.
- Remove the sound dampening system ⇒ Body Work ⇒ Rep. Gr. 50 .



- Remove charge air hose -Pos. 1 and 2- and close the charge air cooler with a clean cloth.



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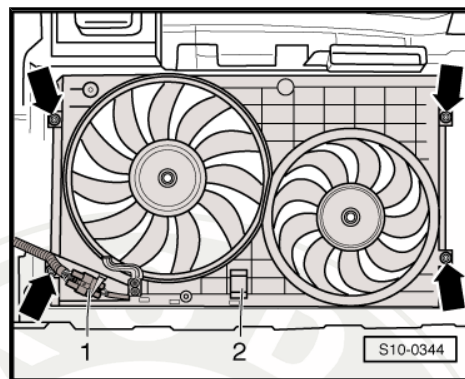


- Disconnect plug connection -1-.
- Release the bottom fixing screws -bottom arrows- of the fan shroud.
- Take out fan shroud downwards.

Install

Installation occurs in reverse order to removal.

- ♦ Tightening torques: ➔ [page 112](#)



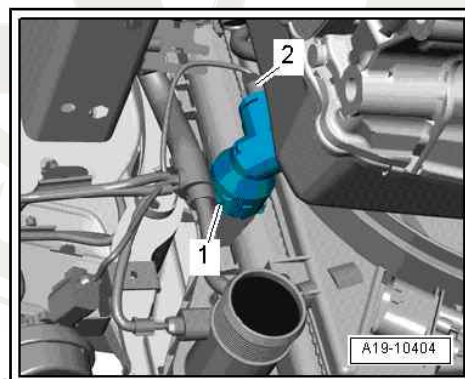
3.2 Removing and installing radiator

Special tools and workshop equipment required

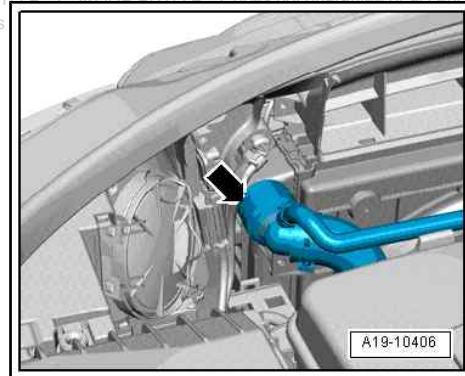
- ♦ Catch pan e.g. -VAS 6208-
- ♦ Pliers for spring strap clamps

Removing

- Unplug connector -2-.
- Drain coolant ➔ [page 114](#) .
- Remove fan shroud with radiator fans ➔ [page 135](#) .



- Remove coolant fitting at top radiator -arrow-.

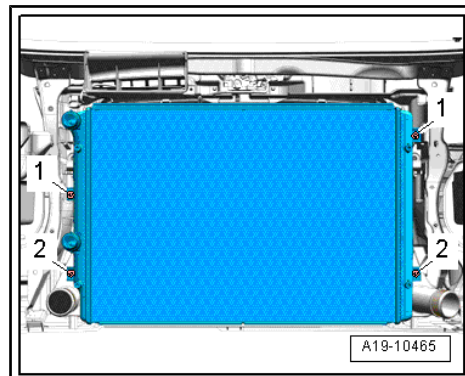


- Screw out screws -1 and 2- and take out radiator downwards.

Install

Installation is carried out in the reverse order. Pay attention to the following:

- ♦ Tightening torques: ➔ [page 112](#)
- If a new radiator is installed, the old (drained) coolant must not be reused.
- Top up coolant ➔ [page 114](#) .





3.3 Checking the coolant system for leak-tightness

3.3.1 Inspecting coolant system with cooling system testing device -V.A.G 1274- for tightness

Special tools and workshop equipment required

- ◆ Cooling system testing device , e.g. -V.A.G 1274-
- ◆ Adapter for cooling system testing device , e.g. -V.A.G 1274/8-
- ◆ Adapter for cooling system testing device , e.g. -V.A.G 1274/9-

Test condition

- The engine is at operating temperature.

Test sequence



WARNING

Hot steam may escape when the compensation bottle is opened.

- ◆ *Wear safety goggles and safety clothing, in order to avoid eye injuries and scalding.*
- ◆ *Cover the cap with a cloth and open carefully.*

- Open compensation bottle.
- Position the cooling system testing device -V.A.G 1274- with adapter -V.A.G 1274/8- on the coolant expansion reservoir.
- Using the hand pump of the testing device generate an over-pressure of approx. 0.1 MPa (1.0 bar).

If the pressure drops:

- Determine position of the leak and repair fault.

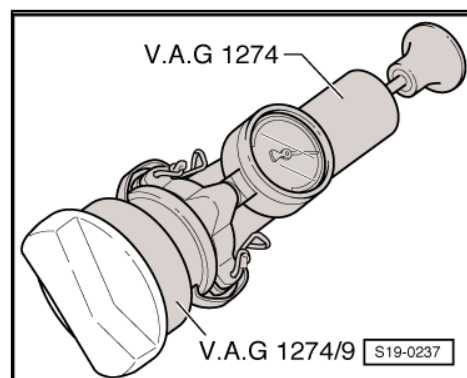
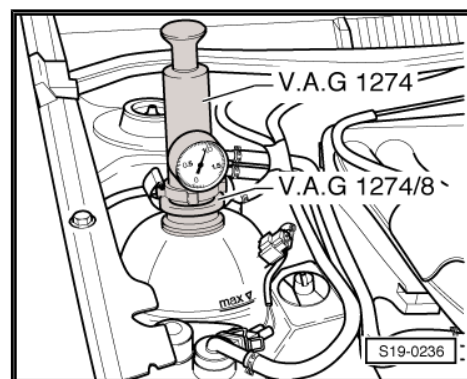
Testing the pressure relief valve in the cap

- Position the cooling system testing device -V.A.G 1274- with adapter -V.A.G 1274/9- on the cap.
- Operate the handpump.
- The pressure relief valve should open at a pressure of 0.14 ... 0.16 MPa (1.4 ... 1.6 bar).

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The pressure relief valve opens too early or too late.

- Replace cap.



3.3.2 Inspecting coolant system with cooling system testing device -V.A.G 1274 B- for tightness

Special tools and workshop equipment required

- ◆ Cooling system testing device , e.g. -V.A.G 1274 B-
- ◆ Adapter for cooling system testing device , e.g. -V.A.G 1274/8-
- ◆ Adapter for cooling system testing device , e.g. -V.A.G 1274/9-

Test condition

- The engine is at operating temperature.

Test sequence



WARNING

Hot steam may escape when the compensation bottle is opened.

- ◆ *Wear safety goggles and safety clothing, in order to avoid eye injuries and scalding.*
- ◆ *Cover the cap with a cloth and open carefully.*

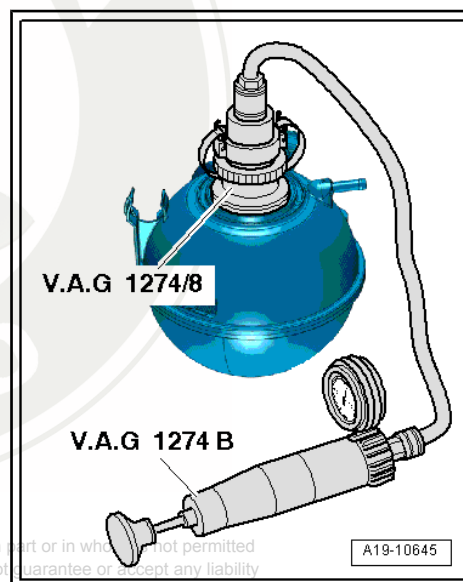
- Open compensation bottle.
- Screw the adapter for cooling system testing device -V.A.G 1274/8- into the coolant expansion bottle.
- Clamp the connecting piece -V.A.G 1274 B/1- in the adapter for cooling system testing device -V.A.G 1274/8- .
- Connect the connecting piece -V.A.G 1274 B/1- via the delivered connecting hose to the cooling system testing device -V.A.G 1274 B- .
- Using the hand pump of the testing device generate an over-pressure of approx. 0.1 MPa (1.0 bar).



WARNING

Risk of burning!

- ◆ *Before the cooling system testing device -V.A.G 1274 B- is separated from the connecting hose or the connecting piece -V.A.G 1274 B/1- , the existing pressure must absolutely be released.*
- ◆ *For this step, press the pressure relief valve on the cooling system testing device -V.A.G 1274 B- and hold it pressed until the pressure gauge indicates the value "0".*



If the pressure drops:

- Determine position of the leak and repair fault.

Testing the pressure relief valve in the cap

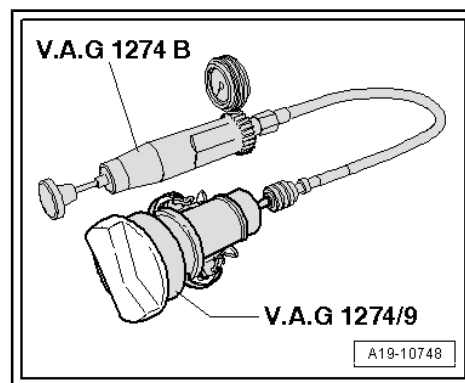
- Screw the screw cap into the adapter for cooling system testing device -V.A.G 1274/9- .
- Clamp the connecting piece -V.A.G 1274 B/1- in the adapter for cooling system testing device -V.A.G 1274/9- .



- Connect the connecting piece -V.A.G 1274 B/- via the delivered connecting hose to the cooling system testing device - V.A.G 1274 B- .
- Operate the handpump.
- The pressure relief valve should open at a pressure of 0.14...0.16 MPa (1.4...1.6 bar).

The pressure relief valve opens too early or too late.

- Replace cap.



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20 – Fuel Supply

1 Fuel tank and fuel delivery unit



Note

- ♦ Fuel hoses at the engine must only be secured with spring-type clips ⇒ electronic catalogue of original parts.
- ♦ Use pliers for spring strap clamps to fit the spring strap clips.

1.1 Fuel tank for vehicles with front-wheel drive - Summary of components

1 - Mounting part

2 - Screw cap

- ☐ replace if damaged

3 - Earth connection

- ☐ check for firm seating

4 - 11 Nm

5 - Cable guide

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6 - 25 Nm

- ☐ replace

7 - Fuel tank

- ☐ removing and installing
⇒ [page 146](#)

8 - Circlip

9 - Bracket for the exhaust system

10 - Tensioning strap

- ☐ Check fitting position

11 - Shield

12 - Feed line

- ☐ to fuel rail
- ☐ check for firm seating

13 - Fuel filter

- ☐ Fitting position: arrow points in direction of flow

14 - Vent line

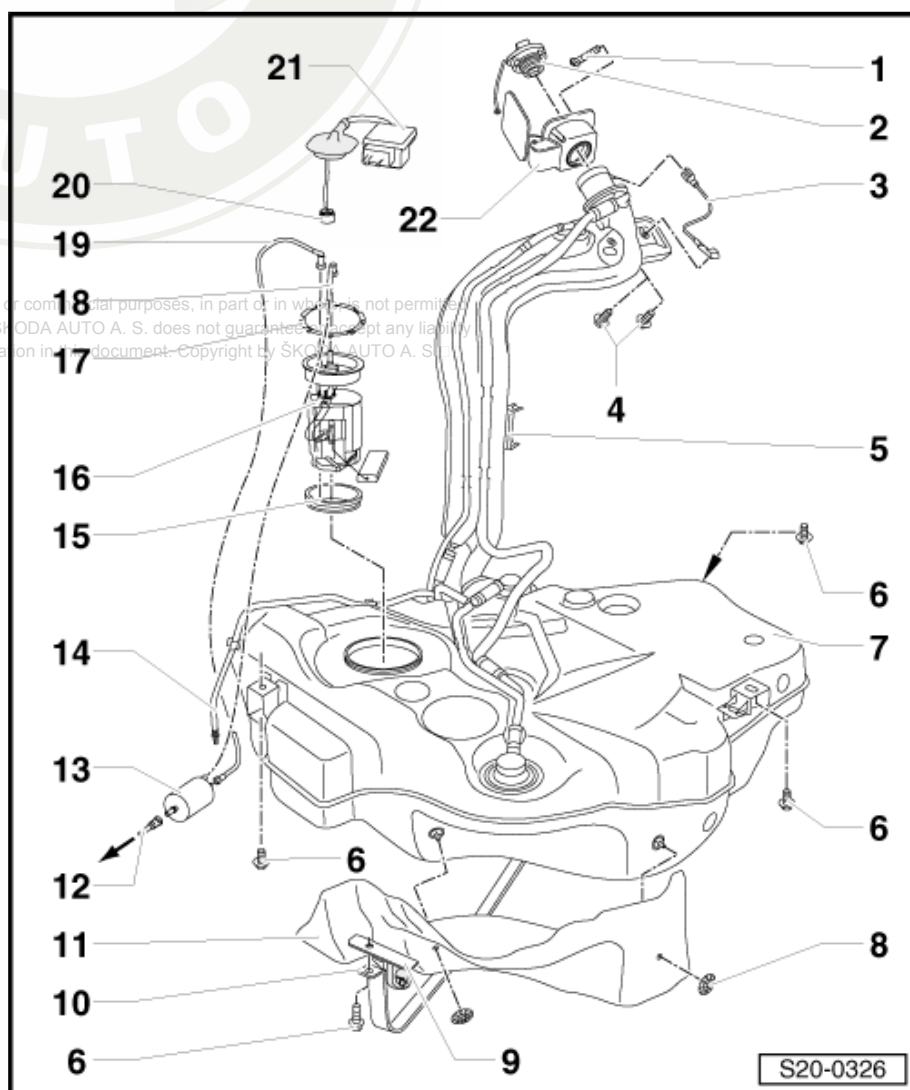
- ☐ clipped in place on the side of the fuel tank
- ☐ check for firm seating

15 - Sealing ring

- ☐ replace
- ☐ to be inserted dry into the opening of the fuel tank
- ☐ only moisten the inner seal of the flange with fuel for fitting purposes

16 - Fuel delivery unit

- ☐ removing and installing ⇒ [page 152](#)





- ☐ inspecting fuel pump ➔ [page 160](#)
- ☐ note the installed position of the fuel tank ➔ [page 141](#)
- ☐ with sender for fuel gauge display -G -
- ☐ Removing and installing the sender for fuel gauge display -G- ➔ [page 159](#)
- ☐ Clean strainer if dirty

17 - Lock ring, 110 Nm

- ☐ check for firm seating
- ☐ use wrench -T30101 (3087)- for removing and installing

18 - Feed line

- ☐ black
- ☐ clipped in place on the side of the fuel tank
- ☐ check for firm seating

19 - Return-flow line

- ☐ blue
- ☐ clipped in place on the side of the fuel tank
- ☐ check for firm seating

20 - Fuel pump control unit -J538 -

- ☐ after replacing, adapt the engine control unit -J623 - to the fuel pump control unit -J538- ➔ Vehicle diagnosis, testing and information system VAS 5051
- ☐ check ➔ Vehicle diagnosis, testing and information system VAS 5051

21 - Fuel tank lid unit

- ☐ with rubber bowl
- ☐ removing and installing ➔ Body Work ➔ Rep. Gr. 55

Fitting location of the fuel delivery unit

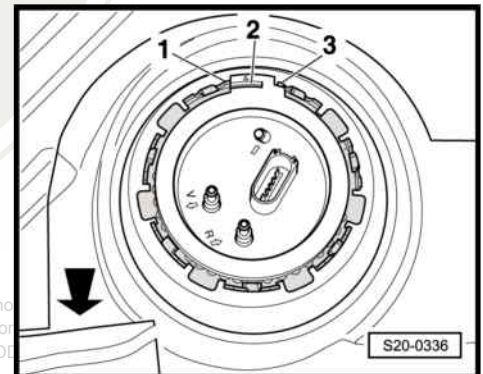
The peg -2- on the fuel delivery unit must be between the pegs -1- and -3-.



Note

- ◆ -Arrow- points in direction of travel.
- ◆ The fuel delivery unit can only be installed in this position.

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1.2 Fuel tank for vehicles with four-wheel drive - Summary of components

1 - Feed line

- ☐ black
- ☐ check for firm seating

2 - Return-flow line

- ☐ blue
- ☐ check for firm seating

3 - Sealing ring

- ☐ replace
- ☐ insert dry into the opening of the fuel tank
- ☐ only moisten the inner seal of the flange with fuel for fitting purposes

4 - Fuel delivery unit

- ☐ removing and installing for vehicles up to MY 2008 ➤ [page 153](#)
- ☐ removing and installing for vehicles as of MY 2009 ➤ [page 156](#)
- ☐ inspecting fuel pump ➤ [page 160](#)
- ☐ note the installed position of the fuel tank ➤ [page 143](#)
- ☐ with sender for fuel gauge display -G -
- ☐ Removing and installing the sender for fuel gauge display -G- ➤ [page 159](#)
- ☐ If strainer is dirty - clean

5 - Lock ring, 110 Nm

- ☐ check for firm seating
- ☐ use wrench -T30101 (3087)- for removing and installing

6 - Fuel pump control unit -J538-

- ☐ after replacing, adapt the engine control unit -J623 - to the fuel pump control unit -J538- ➤ Vehicle diagnosis, testing and information system VAS 5051
- ☐ check ➤ Vehicle diagnosis, testing and information system VAS 5051

7 - Screw cap

- ☐ replace if damaged

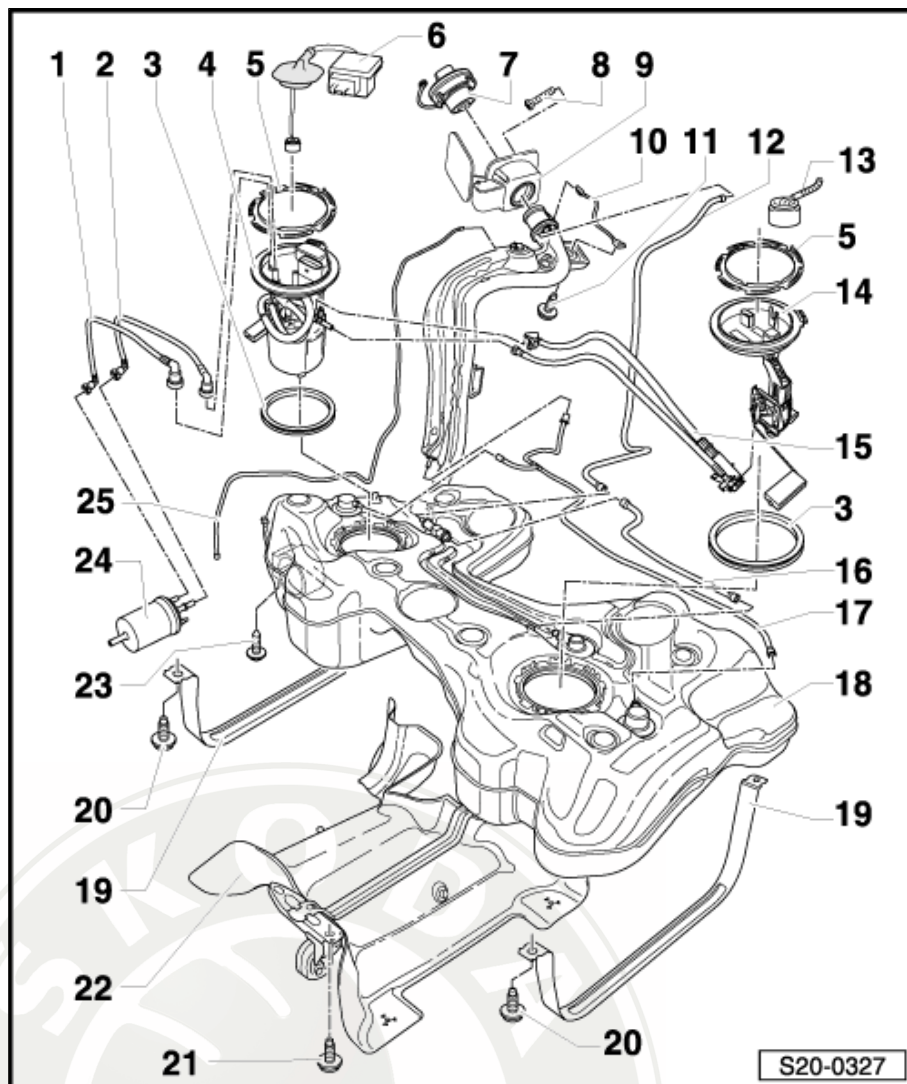
8 - Fixing screw

9 - Fuel tank lid unit

- ☐ with rubber bowl
- ☐ Removing and installing ➤ [Body Work; Rep. Gr. 55](#)

10 - Earth connection

- ☐ check for firm seating





11 - 11 Nm

12 - Ventilation for fuel delivery

13 - Connector

- ☐ for fuel gauge sender -2- -G169-

14 - Fuel gauge sender -2- -G169-

- ☐ removing and installing ⇒ [page 169](#)

15 - Suction spray pump

- ☐ clipped in place on fuel gauge sender -2- -G169-
- ☐ removing and installing ⇒ [page 172](#)

16 - Ventilation for fuel delivery

17 - Vent line

18 - Fuel tank

- ☐ removing and installing ⇒ [page 148](#)

19 - Tensioning strap

- ☐ Check fitting position

20 - 25 Nm

- ☐ replace

21 - 23 Nm

22 - Shield

- ☐ riveted together with hanger of exhaust system

23 - 3 Nm

24 - Fuel filter

- ☐ Summary of components ⇒ [page 144](#)

25 - Vent line

- ☐ clipped in place on the side of the fuel tank
- ☐ check for firm seating

Fitting position of the flange of the fuel delivery unit and the fuel gauge sender -2- -G169-

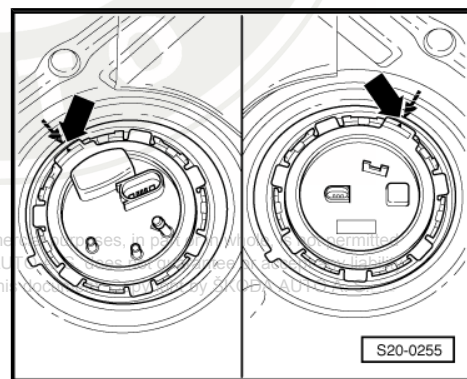
The marking on the flange must be aligned with marking on the fuel tank -arrows-.



Note

The arrows on the fuel tank are hardly visible due to the floor panel.

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1.3 Fuel filter - Summary of components

1 - Fuel filter

- ☐ with installed pressure limiting valve for fuel re-turn-flow line

Opening pressure:
0.60...0.68 MPa (6.0...
6.8 bar)

- ☐ do not interchange connections
- ☐ Fitting position
⇒ [page 144](#)

2 - Fuel feed line

- ☐ black
- ☐ from fuel tank
- ☐ press in securing ring in order to unlock

3 - Fuel return-flow line

- ☐ blue
- ☐ to fuel tank
- ☐ press in securing ring in order to unlock

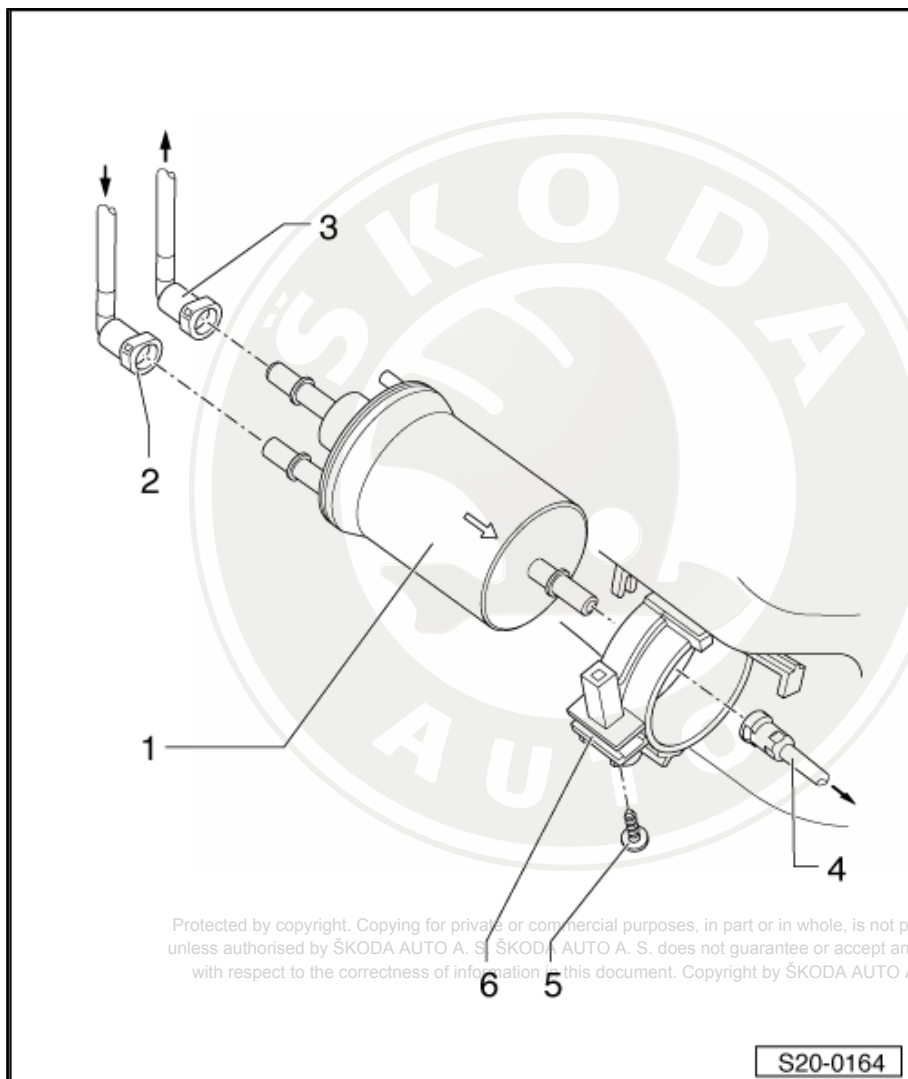
4 - Fuel feed line

- ☐ black
- ☐ to the engine
- ☐ press in securing ring in order to unlock

5 - 3 Nm

6 - Support

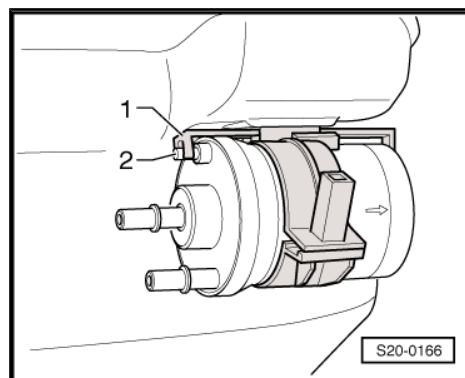
- ☐ for fuel filter
- ☐ attached to the fuel tank



Fitting position of the fuel filter

The pin -2- at the filter housing must engage in the recess -1- of the bracket.

The direction of flow is marked by arrows.



1.4 Extract fuel from the fuel tank

Special tools and workshop equipment required

- ◆ Hose adapter , e.g. -V.A.G 1318 -16 -
- ◆ Adapter , e.g. -V.A.G 1318 -17-
- ◆ Measuring tool set , e.g. -V.A.G 1594 C-

- ◆ Battery
- ◆ Fuel tank

i Note

If there are functional problems of the fuel delivery unit suction off fuel with fuel extraction device e.g. -VAS 5190-.

Work procedure

i Note

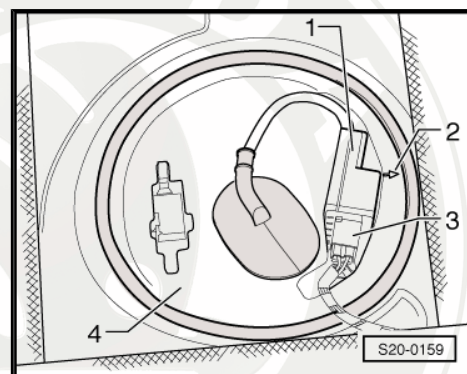
- ◆ *Safety precautions when working on the fuel supply system*
⇒ [page 3](#).
- ◆ *Rules of cleanliness when working on the fuel supply system*
⇒ [page 5](#).

- Switch off the ignition and all electrical components and take out the ignition key.
- Removing rear seat bench ⇒ Body Work; Rep. Gr. 72 .
- Unclip the cover -4- with the fuel pump control unit -J538- -1-.

Vehicles with auxiliary heating.

- Unplug the 2-pin plug of the dosing pump -V54- .

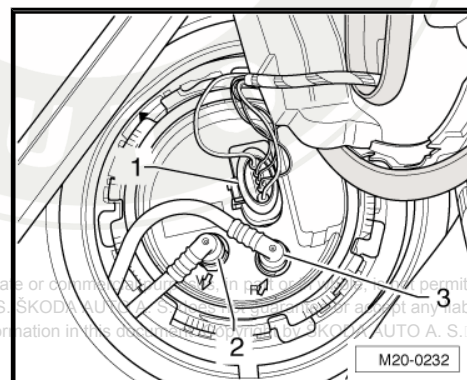
Continued for all vehicles



- Unplug the 5-pin plug -1- from the black feed line -2-.

i Note

Press in securing ring in order to unlock the lines.



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- Connect the adapter -V.A.G 1318/16- with the adapter -V.A.G 1318/17- and fit this “drain pipe” thus prepared onto the feed support of the fuel delivery unit.
- Hold the “drain pipe” in a suitable fuel tank.
- Connect the battery and the contacts of the fuel pump with adapter cables -A- from the adapter cable set -V.A.G 1594/C- as follows:

Battery positive (+) to contact -1- of the fuel pump

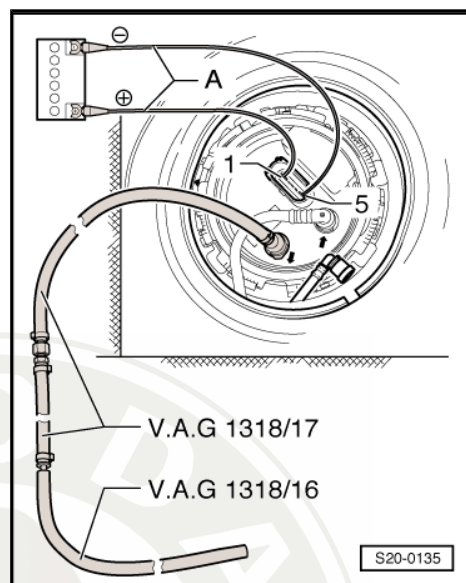
Battery minus (-) to contact -5- of the fuel pump

The fuel pump runs and suctions off fuel.



WARNING

In order to prevent an overflow of fuel in case of a too small fuel tank, the fuel pump must not run unattended.



1.5 Removing and installing fuel tank for vehicles with front-wheel drive

Special tools and workshop equipment required

- ♦ Engine/gearbox jack , e.g. -V.A.G 1383 A-
- The fuel tank must be empty for weight reasons when removing it, if necessary suction the fuel out of the fuel tank
⇒ [page 144](#) .

Removing



Note

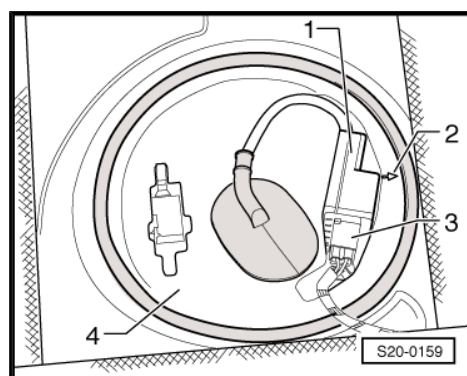
- ♦ *If necessary drain the fuel tank* ⇒ [page 144](#) .
- ♦ *Safety precautions when working on the fuel supply system*
⇒ [page 3](#) .
- ♦ *Rules of cleanliness when working on the fuel supply system*
⇒ [page 5](#) .

- Switch off the ignition and all electrical components and take out the ignition key.
- Removing rear seat bench ⇒ Body Work; Rep. Gr. 72 .
- Unclip the cover -4- with the fuel pump control unit -J538- -1-.



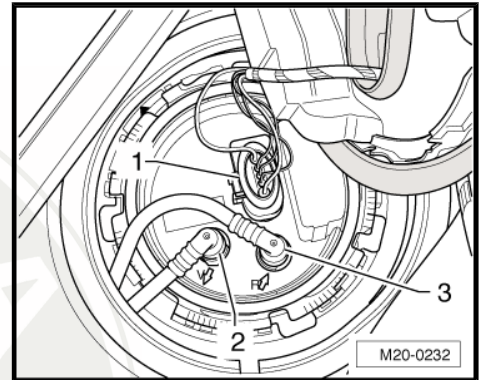
Note

For vehicles with auxiliary heating, the plug connection for the dosing pump -V54- must also be disconnected.

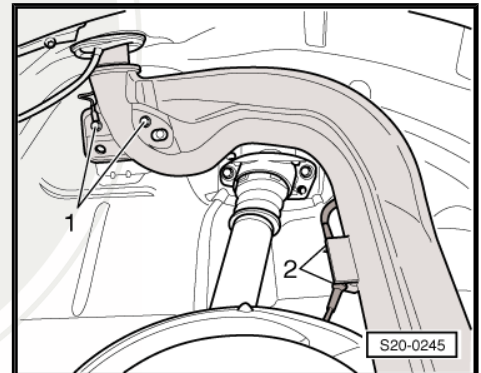




- Unplug the 5-pin plug -1- from the fuel pump.
- Clean around the fuel filler neck.
- Unscrew right rear wheel.
- Remove the rear right wheelhouse liner ⇒ Body Work ⇒ Rep. Gr. 66 .



- Unscrew screws -1- for filler neck on the body.
- Unclip the electrical cable from the bracket -2- at the top and bottom of the filler neck.

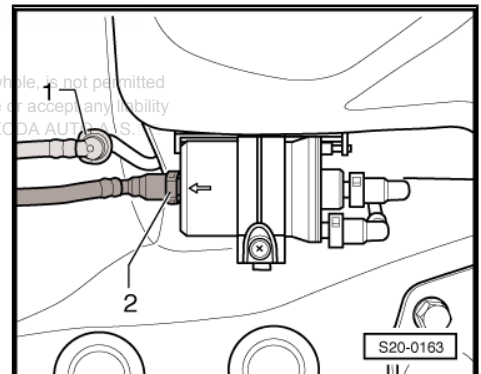


- Disconnect vent line -1- (white) and fuel feed line -2- (black) at the connection point.

**Note**

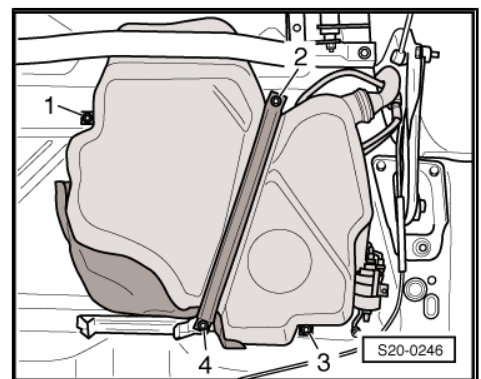
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- ♦ On vehicles with auxiliary heating, the fuel line for the dosing pump -V54- must also be disconnected.
- ♦ Press in the securing ring in order to unlock the line.



- Remove middle part of exhaust system ⇒ [page 238](#) .

- Release fixing screws -2- and -4- and remove the tensioning strap.
- Support fuel tank using the engine/gearbox jack -V.A.G 1383 A- .
- Release fixing screws -1- and -3-.
- Slightly lower the fuel tank.

**Note**

The filler neck must be "extracted" between structure and rear axle Lift down the fuel tank with a 2nd mechanic from engine/gearbox jack -V.A.G 1383 A- .

Install

- Check if the earth lead shows traces of oxidation on both connections, remove if necessary.



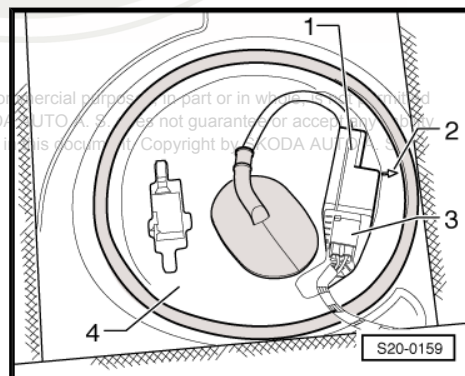
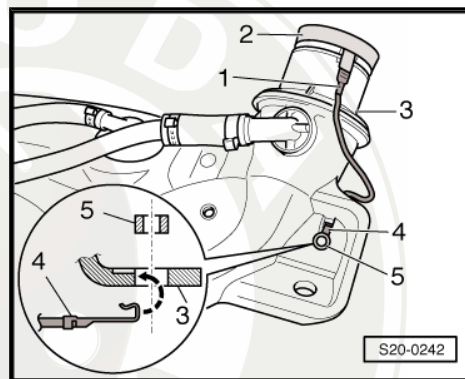
- Check fitting position of the earth lead -1-.
- The plug -1- must tightly fit on the plate ring -2-.
- The contact tab -4- must be hung in the fuel tank -3- and secured with the spacer bush -5-.
- Guide the filler neck between rear axle and structure with the assistance of a 2nd mechanic. Then position the fuel tank onto the engine/gearbox jack -V.A.G 1383 A- .

Further installation occurs in reverse order. Pay attention to the following:

- ◆ Lay the vent and fuel lines without any kinks.
- ◆ Do not mix-up the feed line and the return-flow line (the return-flow line is blue, the feed line is black).
- ◆ Make sure the line connections fit tightly.
- ◆ Check earth connection of fuel tank/body at filler neck.
- ◆ After installing the fuel tank, check whether the lines are also clipped in place on the fuel tank.

- Clip on cover -4- with fuel pump control unit -J538- -1-.

The arrow -2- on the cover points in direction of travel.



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1.6 Removing and installing fuel tank for vehicles with four-wheel drive

Special tools and workshop equipment required

- ◆ Engine/gearbox jack , e.g. -V.A.G 1383 A-
- The fuel tank must be empty for weight reasons when removing it, if necessary suction the fuel out of the fuel tank
⇒ [page 144](#) .

Removing



Note

- ◆ *Safety precautions when working on the fuel supply system*
⇒ [page 3](#) .
- ◆ *Rules of cleanliness when working on the fuel supply system*
⇒ [page 5](#) .
- Switch off all electrical components and withdraw key from ignition key housing.
- Removing rear seat bench ⇒ Body Work; Rep. Gr. 72 .



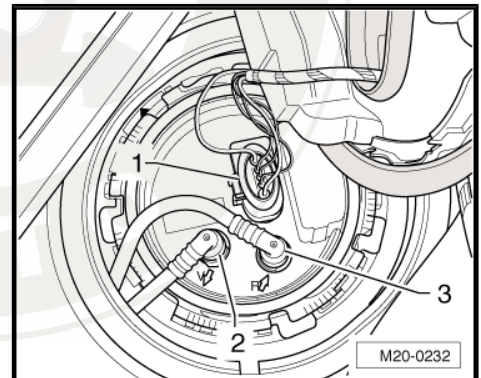
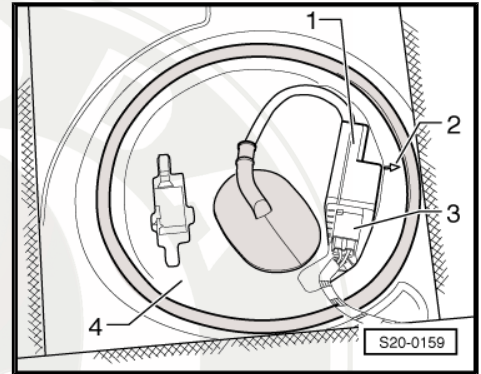
- Unclip the cover -4- with the fuel pump control unit -J538- -1-.

Vehicles with auxiliary heating.

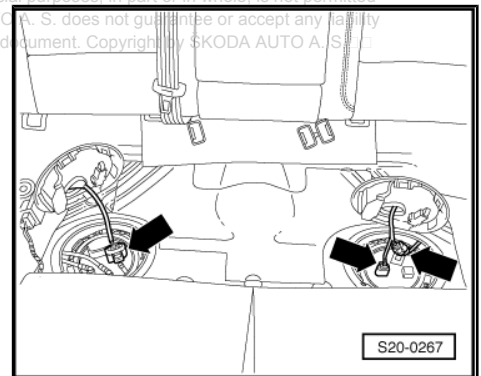
- Unplug the 2-pin plug of the dosing pump -V54- .
- Remove the rubber grommet from the cover of the fuel delivery unit and pull out the wiring.

Continued for all vehicles

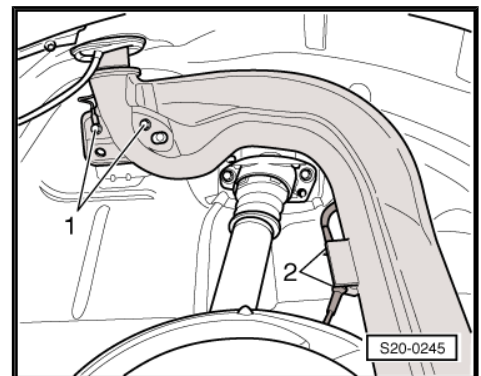
- Unplug the 5-pin plug -1- from the fuel tank.



- Remove the cover of the fuel gauge sender -2- -G169- (in the figure on the right) and unplug the plug -right arrows-.
- Open the fuel tank cap and clean around the fuel filler neck.
- Unscrew the cap from the fuel filler neck.
- Close the opening of the fuel filler neck with a clean foam piece, so that no dirt can penetrate.
- Remove the rear right wheelhouse liner ⇒ Body Work; Rep. Gr. 66 .



- Unscrew screws -1- for filler neck on the body.
- Unclip the electrical cable from the bracket -2- at the top and bottom of the filler neck.





- Disconnect vent line -1- (white) and fuel feed line -2- (black) at the connection point.



Note

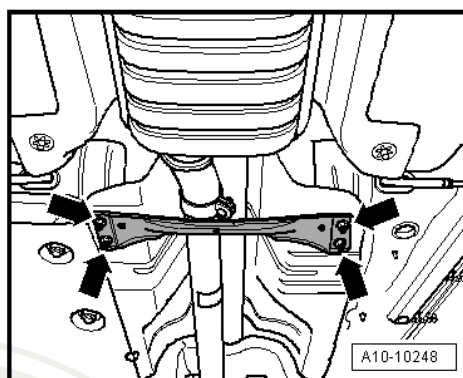
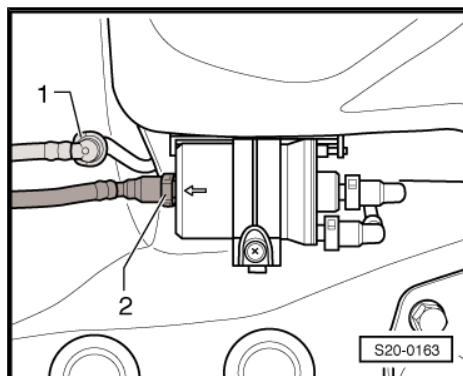
Press in securing ring in order to unlock the lines.

Vehicles with auxiliary heating.

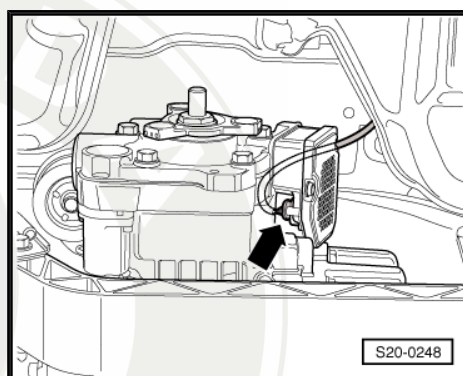
- Separate the fuel line from the dosing pump -V54- .

Continued for all vehicles

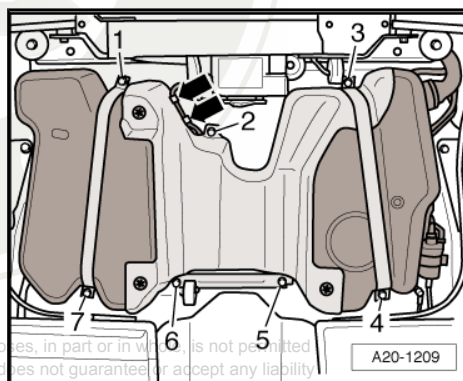
- Remove rear tunnel bridge -arrows-.
- Unhook the rear part of the exhaust system from two retaining straps in front and behind the front silencer.
- Slacken nuts of clamping sleeve.
- Remove screws for rear exhaust pipe hanger.
- Remove rear part of exhaust system.
- Remove propshaft ⇒ Gearbox; Rep. Gr. 39 .



- Disconnect plug -arrow- at four-wheel drive control unit - J492- .



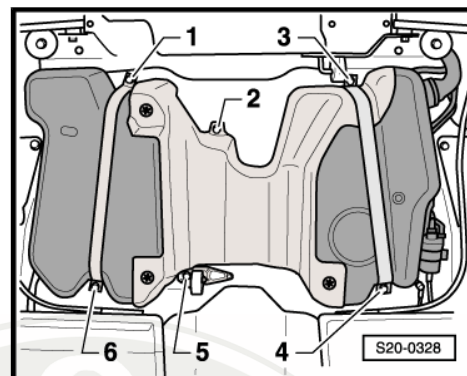
- Unhook the cable harness -arrows- and place it to the side.



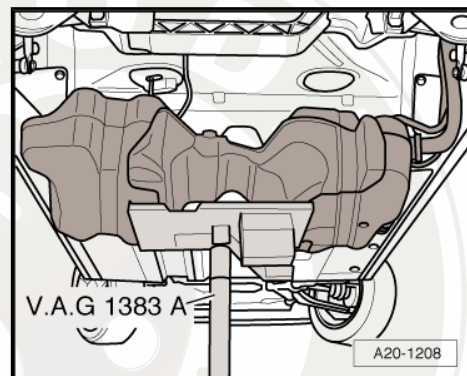
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- First of all screw out the screws -2- and -5-.

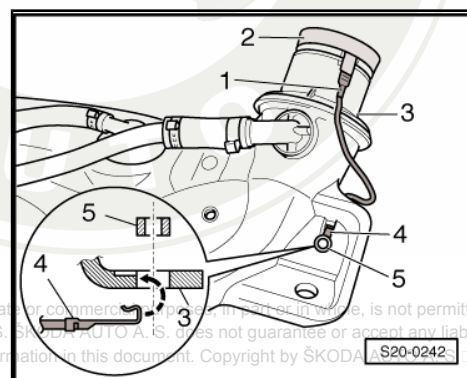


- Support the fuel tank using the engine/gearbox jack -V.A.G 1383 A- .
- Unscrew the screws for the straps -1, 3, 4- and -6-.
- Lower slightly the fuel tank using the engine/gearbox jack - V.A.G 1383 A- .
- Then remove the fuel tank from the engine/gearbox jack - V.A.G 1383 A- and pull through the filler neck between the body and the rear axle with the help of a second mechanic.



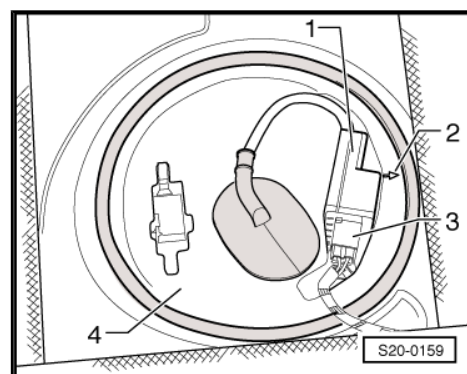
Install

- Check if the earth lead shows traces of oxidation on both connections, remove if necessary.
- Check fitting position of the earth lead -1-.
- The plug -1- must tightly fit on the plate ring -2-.
- The contact tab -4- must be hung in the fuel tank -3- and secured with the spacer bush -5-.
- Guide the filler neck between rear axle and structure with the assistance of a 2nd mechanic. Then position the fuel tank onto the engine/gearbox jack -V.A.G 1383 A- .



Further installation occurs in reverse order. Pay attention to the following:

- ◆ Lay the vent and fuel lines without any kinks.
- ◆ Do not mix-up the feed and return line (the return line is blue, the feed line is black).
- ◆ Make sure the line connections fit tightly.
- ◆ Check the earth connection of the fuel tank at the body on the filler neck.
- ◆ After installing the fuel tank, check whether the lines are also clipped in place on the fuel tank.
- Clip on cover -4- with fuel pump control unit -J538- -1-.
- The arrow -2- on the cover points in direction of travel.





1.7 Removing and installing fuel delivery unit for vehicles with front-wheel drive

Special tools and workshop equipment required

- ◆ Key -T30101 (3087)-

Removing

- The fuel tank must not be more than $\frac{3}{4}$ full.



Note

- ◆ If necessary, extract fuel from the fuel tank ⇒ [page 144](#).
- ◆ Observe the safety instructions before starting fitting work ⇒ [page 3](#).
- ◆ Observe the rules for cleanliness ⇒ [page 5](#).
- Switch off the ignition and all electrical components and take out the ignition key.
- Removing rear seat bench ⇒ Body Work; Rep. Gr. 72.
- Unclip the cover -4- with the fuel pump control unit -J538- -1-.



Note

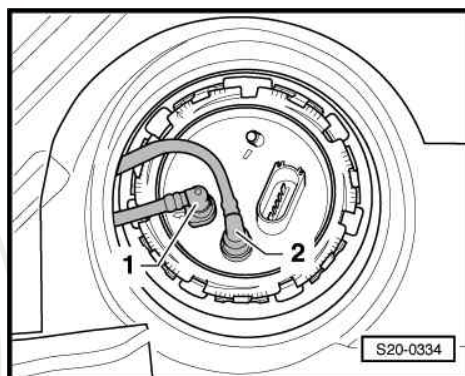
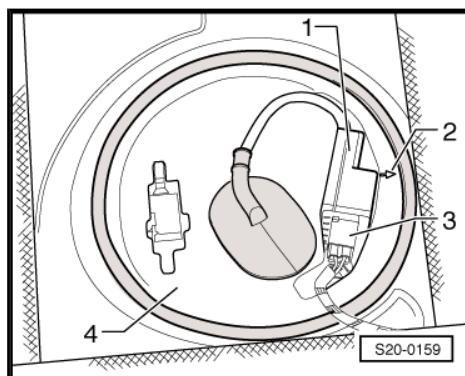
For vehicles with auxiliary heating, the plug connection for the dosing pump -V54- must be disconnected additionally.

- Unplug the 5-pin plug, the black feed line -1- and the blue re-turn-flow line -2-.



Note

- ◆ Press in securing ring in order to unlock the lines.
- ◆ For vehicles with auxiliary heating the suction line for the dosing pump -V54- must be pulled out additionally (open lower clamp).



- Unlock lock ring with the wrench -T30101- .



Note

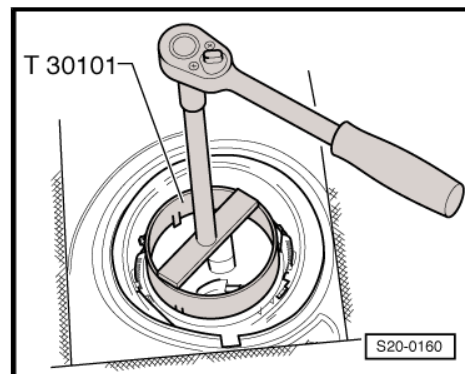
- ◆ Take the fuel delivery unit out of the fuel tank in such a way that the electrical cables and the fuel hoses are not damaged and that the float arm of the sender for the fuel gauge display -G- is not bent.
- ◆ You must empty the old delivery unit before disposing of it if you wish to replace the fuel delivery unit.

- Pull the fuel delivery unit out of the opening of the fuel tank.

Install

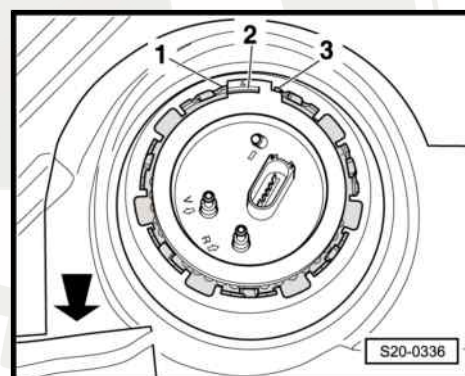
Installation occurs in reverse order. Pay attention to the following:

- Insert the new dry gasket ring into the opening of the fuel tank and moisten only from the inside with fuel for installing the closing flange.
- Insert the fuel delivery unit into the fuel tank in such a way that the float arm of the sender for the fuel gauge display -G- is not bent.
- Press the closing flange downwards, install the lock ring and connect the fuel lines.

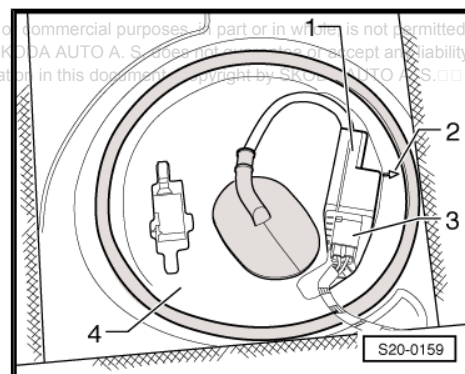


Note

- ◆ Pay attention to installed position of flange of fuel delivery unit: The peg -2- on the fuel delivery unit must be between the pegs -1- and -3-. -Arrow- points in direction of travel.
- ◆ Tighten the lock ring to 110 Nm.
- ◆ Do not interchange the black feed line with the blue return-flow line (arrows on the flange of the fuel delivery unit).
- ◆ Make sure the line connections and the 5-pin plug fit tightly.
- ◆ After installing the fuel delivery unit, check whether the feed and return-flow lines are also clipped on the fuel tank.



- Clip on cover -4- with fuel pump control unit -J538- -1-. The arrow -2- on the cover points in direction of travel.



1.8 Removing and installing the fuel delivery unit for vehicles with four-wheel drive up to MY 2008

Special tools and workshop equipment required

- ◆ Wrench for the lock ring -T30101 (3087) -



- ◆ Protective gloves

Removing

Precondition

- The fuel tank must not be more than $\frac{1}{3}$ full.



Note

- ◆ If necessary, extract fuel from the fuel tank ➔ [page 144](#).
- ◆ Safety precautions when working on the fuel supply system ➔ [page 3](#).
- ◆ Rules of cleanliness when working on the fuel supply system ➔ [page 5](#).
- Switch off ignition and withdraw ignition key.
- Removing rear seat bench ➔ Body Work; Rep. Gr. 72.
- Remove the cover from the fuel delivery unit.



Note

For vehicles with auxiliary heating, the plug connection for the dosing pump -V54- must be disconnected additionally.

- Disconnect the plug as well as the black feed line -1- and the blue return-flow line -2- from the flange.

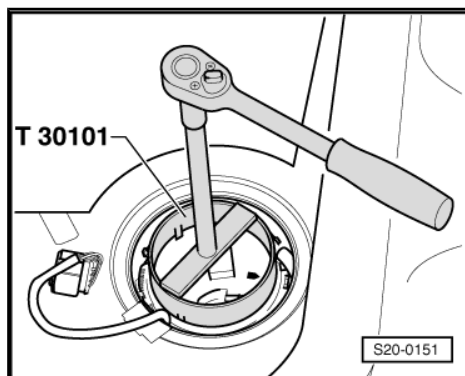
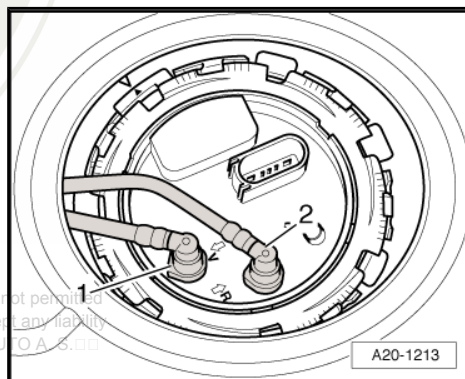


Note

- ◆ Press in securing ring in order to unlock the lines.
- ◆ For vehicles with auxiliary heating the suction line for the dosing pump -V54- must be pulled out additionally (open lower clamp).

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- Open lock ring with the wrench -T30101 - .
- Pull out closing flange and gasket ring of the fuel delivery unit from the opening of the fuel tank and place to the side with the connected lines.



- Separate through the opening of the fuel tank the fuel line -1- to the suction jet pump, to do so press the release button.
- Unhook the fuel delivery line -2- at the fuel delivery unit, to do so pull the fixing clamp upwards -arrow-.



Note

- ◆ *You must wear protective gloves for removing the fuel delivery unit.*
- ◆ *Take the fuel delivery unit out of the fuel tank in such a way that the electrical cables and the fuel hoses are not damaged and that the float arm of the sender for the fuel gauge display -G- is not bent.*
- ◆ *You must empty the old delivery unit before disposing of it if you wish to replace the fuel delivery unit.*

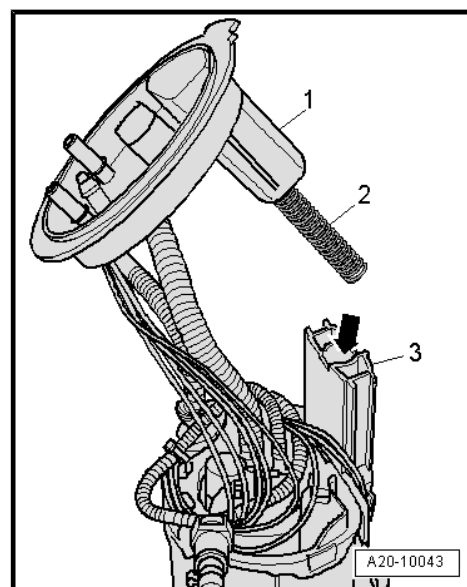
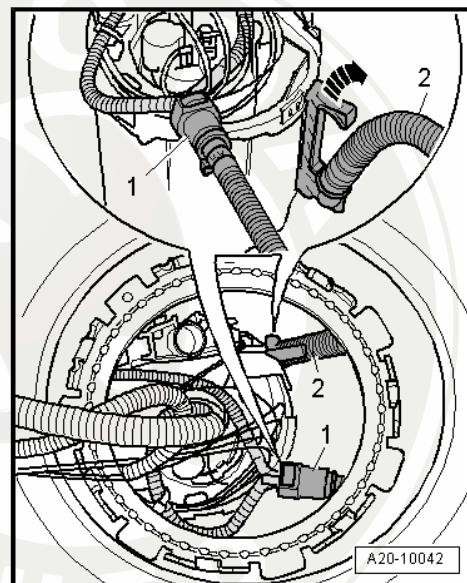
- Pull the fuel delivery unit out of the opening of the fuel tank.

Install

The installation of the fuel delivery unit occurs in the reverse order. Pay attention to the following:

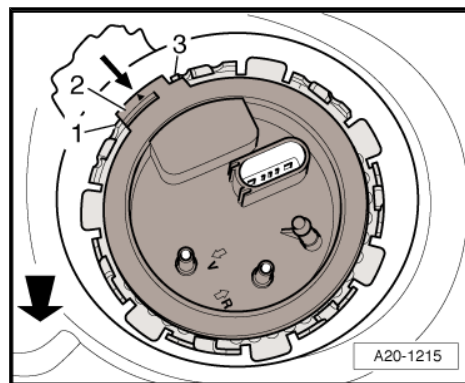
- Insert the fuel delivery unit into the fuel tank with the closing flange placed to the side. Thus, do not bend the float arm of the fuel gauge sender unit -G- .
- Install the fuel delivery unit and the fuel line.
- Insert the new dry gasket ring into the opening of the fuel tank and moisten only from the inside with fuel for installing the closing flange.
- Slide the spring -2- into the opening of the guide -arrow- and fit the cable -1- of the closing flange on the cable -3- of the fuel delivery unit.
- Press the closing flange down and adjust it in the installation position.

Further information:





- ◆ Observe the fitting location of the fuel delivery unit. The peg -2- on the closing flange must be between the tongues -1- and -3-. The -thick arrow- points in the direction of travel.
- ◆ Tighten the lock ring to 110 Nm.
- ◆ Do not interchange the feed and return lines.
- ◆ Make sure the fuel lines fit tightly.
- ◆ After installing the fuel delivery unit, check whether the feed line and the return-flow line are still clipped in place on the fuel tank.



1.9 Removing and installing the fuel delivery unit for vehicles with four-wheel drive as of MY 2009

Special tools and workshop equipment required

- ◆ Key -T30101 (3087) -
- ◆ Protective gloves

Removing

- The fuel tank must not be more than $\frac{1}{3}$ full.



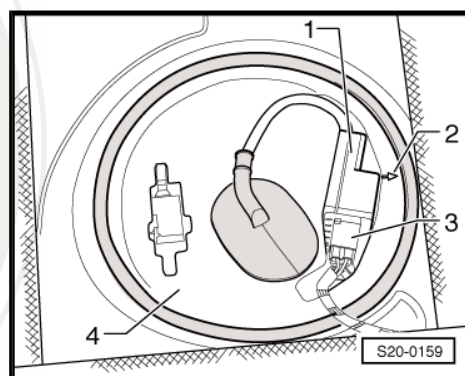
Note

- ◆ *If necessary drain the fuel tank ⇒ [page 144](#) .*
- ◆ *Safety precautions when working on the fuel supply system ⇒ [page 3](#) .*
- ◆ *Rules of cleanliness when working on the fuel supply system ⇒ [page 5](#) .*
- Switch off the ignition and all electrical components and take out the ignition key.
- Removing rear seat bench ⇒ Body Work; Rep. Gr. 72 .
- Unclip the cover -4- with the fuel pump control unit -J538- -1-.

Vehicles with auxiliary heating.

- Unplug the 2-pin plug of the dosing pump -V54- .

Continued for all vehicles





- Disconnect the plug as well as the black feed line -1- and the blue return-flow line -2- from the flange.

**Note**

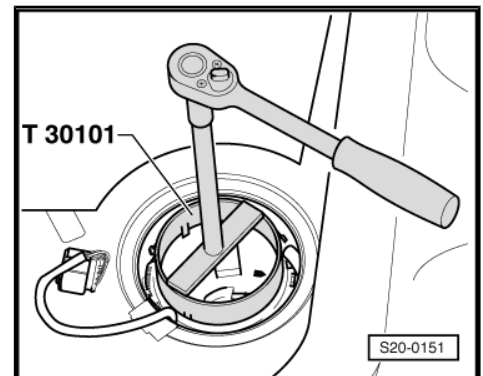
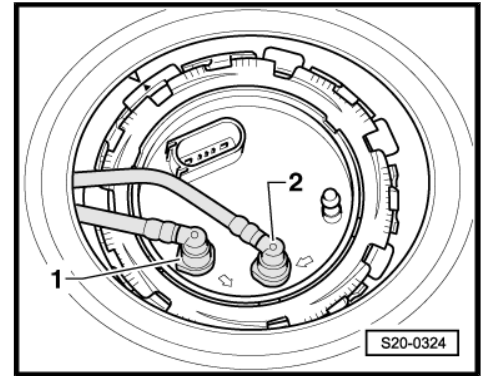
Press in securing ring in order to unlock the lines.

Vehicles with auxiliary heating.

- Pull out the suction line for the dosing pump -V54- (slacken lower terminal).

Continued for all vehicles

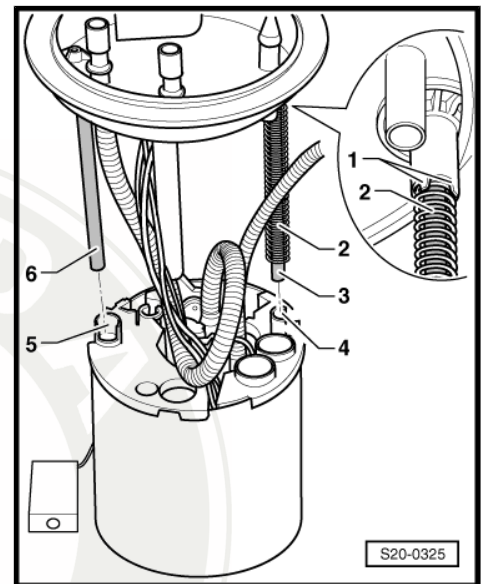
- Open lock ring with the wrench -T30101- .



- Slightly raise the closing flange and check if the spring -2- is still fastened on the flange -1-.

If the spring -2- is loose on the guide pipe -3-, hold it with your fingers while removing the closing flange.

- Pull out closing flange and gasket ring of the fuel delivery unit from the opening of the fuel tank and place to the side with the connected lines.
- Remove the suction jet pump from the fuel gauge sender 2 - G169- ⇒ [page 169](#) .



- Separate through the opening of the fuel tank the fuel line -1- to the suction jet pump, to do so press the release button.
- Separate the fuel delivery line -2- from the fuel delivery unit.



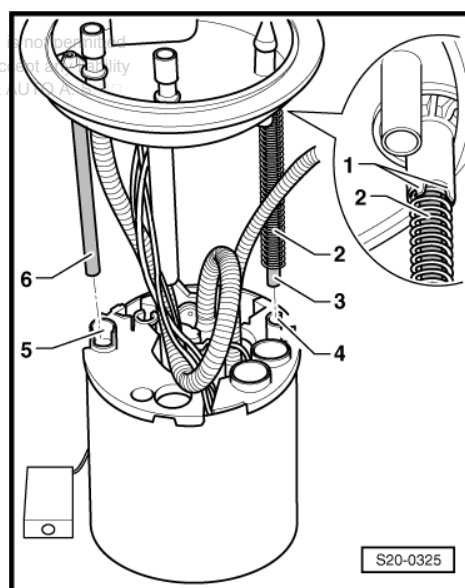
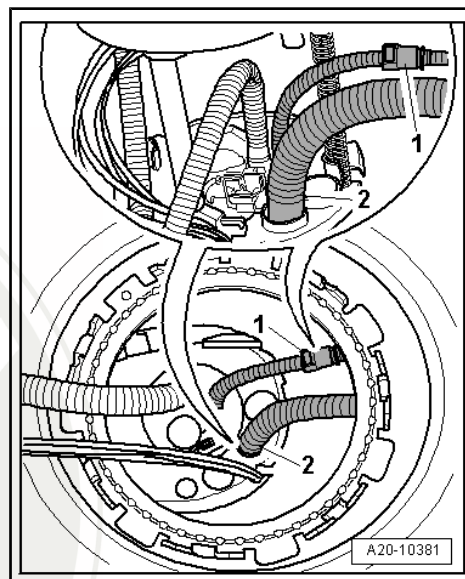
Note

- ◆ *You must wear protective gloves for removing the fuel delivery unit.*
- ◆ *Take the fuel delivery unit out of the fuel tank in such a way that the electrical cables and the fuel hoses are not damaged and that the float arm of the sender for the fuel gauge display - G- is not bent.*
- ◆ *You must empty the old delivery unit before disposing of it if you wish to replace the fuel delivery unit.*
- Pull the fuel delivery unit out of the opening of the fuel tank.

Install

Installation occurs in reverse order. Pay attention to the following:

- Insert the new dry gasket ring into the opening of the fuel tank and moisten only from the inside with fuel for installing the closing flange.
- Insert the fuel delivery unit into the fuel tank with the closing flange placed to the side. Thus, do not bend the float arm of the fuel gauge sender unit - G- .
- Install the fuel delivery unit and the fuel line.
- The spring -2- must be fastened to the retaining lugs -1- of the closing flange.
- First of all guide the guide pipe -3- into the guide bore -4-.
- Then lower the closing flange in such a way that the guide pipe -6- locks into the guide bore -5-.





Note

Pay attention that the electrical cables -1- and the fuel feed line -3- are routed according to the illustration and the float arm -2- is not blocked.

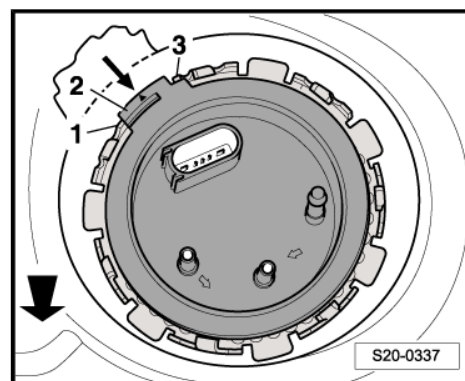
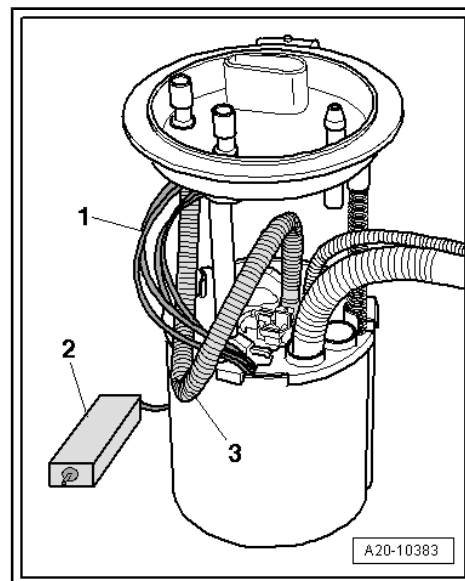
- Press the closing flange down and adjust it in the installation position.

Further information:

- ◆ Fitting position of the fuel delivery unit: The peg -2- at the closing flange must be located between the tongues -1- and -3-. The -thick arrow- points in the direction of travel.

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- ◆ Tighten the lock ring to 110 Nm.
- ◆ Do not interchange the feed and return lines.
- ◆ Make sure the fuel lines fit tightly.
- ◆ After installing the fuel delivery unit, check whether the feed line and the return-flow line are still clipped in place on the fuel tank.



1.10 Removing and installing the sender for fuel gauge display -G-



Note

There are two types of senders for the fuel gauge display -G- installed in the vehicles.

Sender for fuel gauge display -G- type 1

Removing

- Remove fuel delivery unit ➔ [page 153](#) .

- Unlatch and disconnect the plug connection of the lines -1- (brown), -2- (blue) and -3- (black).
- Raise catches -4- and -5- with a screwdriver and remove the sender for fuel gauge display -G- from the bottom -arrow-.

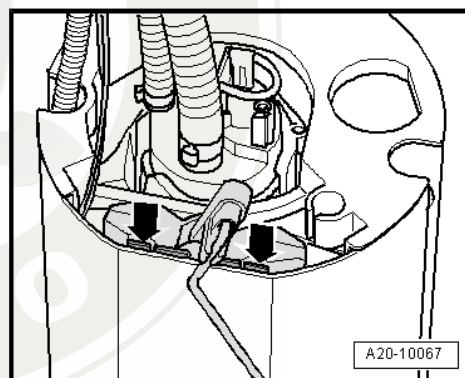
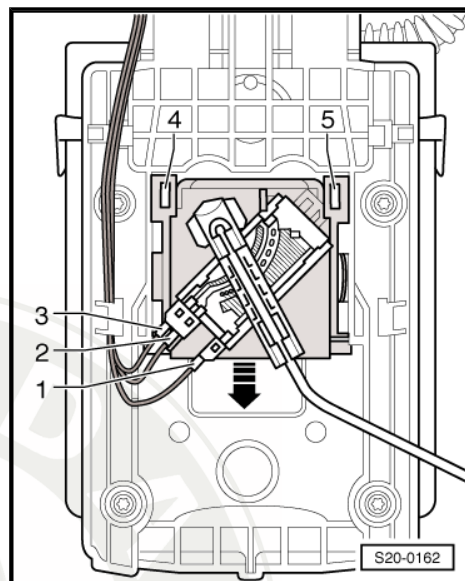
Install

- Insert the sender for the fuel gauge display -G- in the guides at the fuel delivery unit and press upwards until it latches into position.
- Connect the wiring and check correct installation of the plug.
- Install fuel delivery unit ➔ [page 153](#) .

Sender for fuel gauge display -G- type 2

Removing

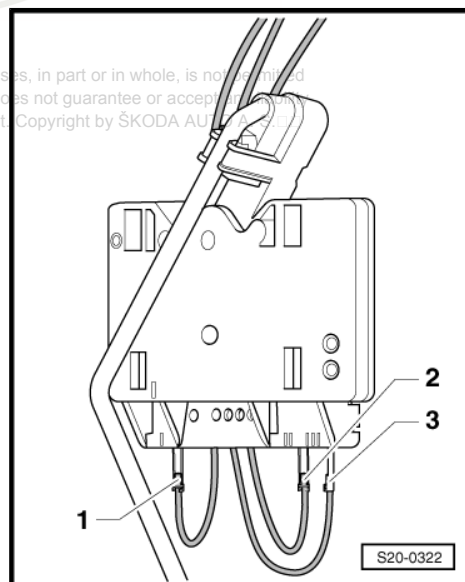
- Remove fuel delivery unit:
- ♦ Vehicles with front-wheel drive ➔ [page 152](#)
- ♦ Vehicles with four-wheel drive ➔ [page 156](#)
- Unlock the securing tabs -arrows- using a screwdriver and pull out the sender for fuel gauge display - G- towards the top.



- Unlatch and disconnect the plug connection of the lines -1- (brown), -2- (blue) and -3- (black).

Install

- Connect the wiring and check correct installation of the plug.
- Insert the sender for fuel gauge display -G- in the guide at the fuel delivery unit and press downwards until it latches into position.
- Install fuel delivery unit:
- ♦ Vehicles with front-wheel drive ➔ [page 152](#)
- ♦ Vehicles with four-wheel drive ➔ [page 156](#)



1.11 Testing fuel pump

Special tools and workshop equipment required

- ♦ Key -T30101 (3087)-
- ♦ Pressure gauge , e.g. -VAS 6550-



- ◆ Remote control , e.g. -V.A.G 1348/3A- with adapter cable , e.g. -V.A.G 1348/3-3 -
- ◆ Voltage tester , e. g. -V.A.G 1527 B-
- ◆ Measuring tool set , e.g. -V.A.G 1594 C-
- ◆ Vehicle diagnosis, measurement and information system - VAS 505x-
- ◆ Measuring vessel

1.11.1 Inspecting proper operation and power supply

Test condition

- Battery voltage at least 11.5 V.
- Fuel pump fuse O.K. ⇒ Current flow diagrams and Fitting locations.
- Fuel pump control unit -J538- O.K.

Test sequence



Note

The function of the fuel pump is tested with the actuator diagnosis.

- Connect vehicle diagnosis, measurement and information system -VAS 505X- .
- Switch on ignition.
- On the display press consecutively the buttons for "Vehicle self-diagnosis", "01 - Engine electronics" and "03 - Actuator diagnosis".
- On the display press the right arrow button up to the actuator diagnosis of the fuel pump electronics.
- The fuel pump must now run slowly to the maximum speed.



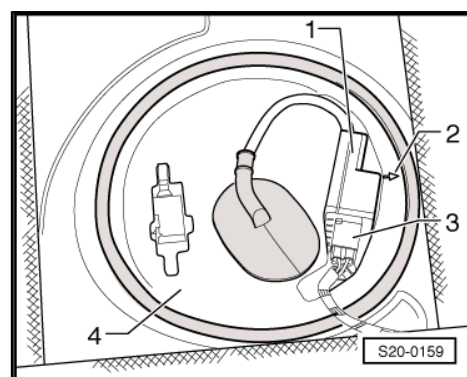
Note

The fuel pump runs very quietly.

- Switch off ignition.

The fuel pump does not run:

- Removing rear seat bench ⇒ Body Work; Rep. Gr. 72 .
- Disconnect plug -3- from fuel pump control unit -J538- .



- Testing the voltage supply with the voltage tester -V.A.G 1527B- between contact -1- and -6-.

- The LED must light up.

The LED does not light up:

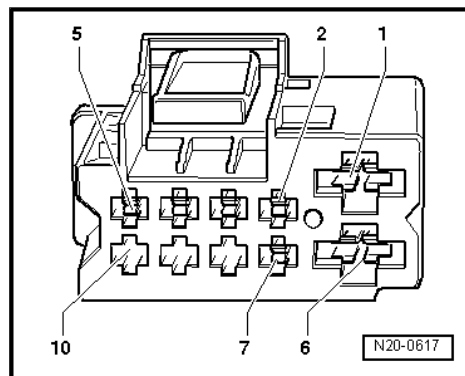
- Determine and remove open circuit in the wiring according to the current flow diagram ⇒ Current flow diagrams and Fitting locations.

The LED lights up (power supply O.°K.):

- Remove fuel delivery unit ⇒ [page 156](#) .
- Check whether the electric wiring between the flange and fuel pump is connected.

If there is no open circuit in the wiring:

- Fuel pump defective, replace the fuel delivery unit
⇒ [page 156](#) .

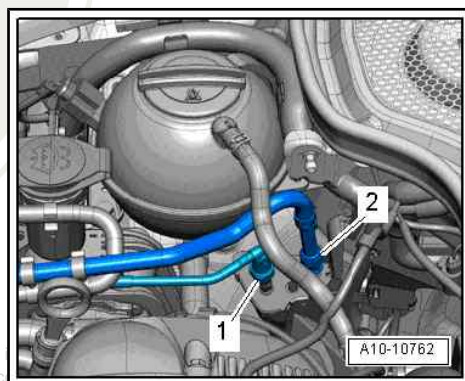


1.11.2 Check fuel pressure



Note

- ◆ *Safety precautions when working on the fuel supply system*
⇒ [page 3](#) .
- ◆ *Rules of cleanliness when working on the fuel supply system*
⇒ [page 5](#) .
- Remove the fuel feed line -2- (press in the securing ring to the top) and catch the fuel which flows out with a cleaning cloth.



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- Connect the pressure gauge -VAS 6550- with the adapter -VAS 6550/1- and -VAS 6550/2- to the fuel feed line.
- Make sure that the discharge cock is closed and the shut-off cocks are opened.
- Switch the ignition on and off so often until the fuel pressure on the pressure gauge does no longer rise.
- Read off fuel pressure on the pressure gauge.
- Specified value: 0.58 ... 0.70 MPa (5.8 ... 7.0 bar)

If fuel line is o.k.:

- Test holding pressure ➔ [page 164](#) .

If the specified pressure is exceeded:

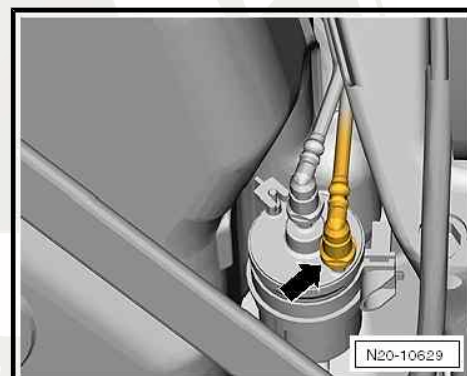
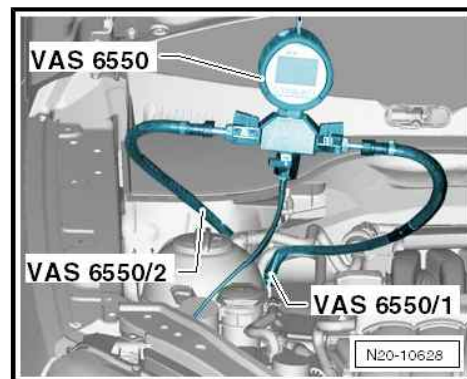
- Check the return line between the fuel filter and fuel pump for kinks and blockages.

If no fault is found:

- Pressure limiting valve in the fuel filter defective, replace the fuel filter.

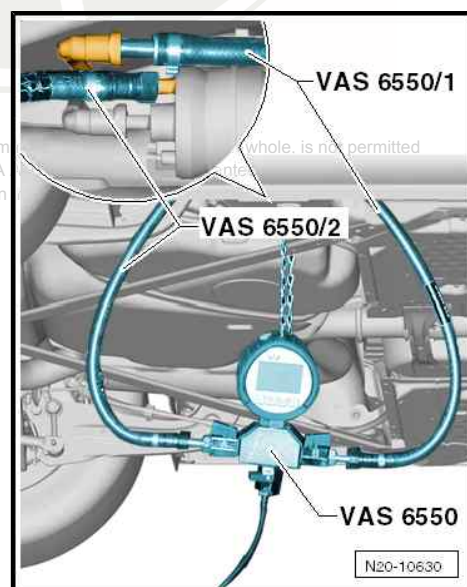
If the specified value is not reached:

- Check the fuel pressure before the fuel filter, to do so proceed as follows:
- Disconnect fuel feed line -arrow- at fuel filter.



- Connect the pressure gauge -VAS 6550- with the adapter -VAS 6550/1- and -VAS 6550/2- between the fuel filter and the fuel feed line.
- Make sure that the discharge cock is opened and the shut-off cocks are opened.
- Start engine and run in idle.

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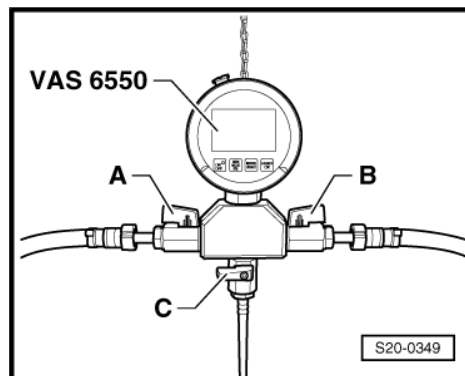
- Slowly close the shutoff cock -A-.
- The pressure must rise to at least 0.70 MPa (7.0 bar).
- If the 0.70 MPa (7.0 bar) is reached, immediately open the shut-off cock again!

If the pressure has risen:

- Fuel pump O.K., pressure limiting valve in the fuel filter defective, replace the fuel filter.

If the pressure does not rise:

- Fuel pump defective, replace the fuel delivery unit
⇒ [page 156](#).



1.11.3 Test holding pressure

- Fuel pressure O.K. and pressure gauge -VAS 6550- connected in the engine compartment ⇒ [page 162](#).
- Switch the ignition on and off so often until the fuel pressure on the pressure gauge does no longer rise.
- Read off fuel pressure on the pressure gauge.
- Specified value: 0.58 ... 0.70 MPa (5.8 ... 7.0 bar)
- Observe pressure drop at pressure gauge.
- The pressure must not drop below 0.3 MPa (3.0 bar) after 10 minutes.

If the pressure still drops:

- Switch the ignition on and off so often until the fuel pressure on the pressure gauge does no longer rise.
- Immediately close the shut-off cock -B- of the pressure gauge after the pressure has built up. The lever points at right angles in the direction of flow.

Now the pressure does no longer drop:



Note

Search for leakage on the engine side. Repeat the holding pressure test. This time, close the shut-off cock -A- in order to determine if a leak is indeed present on the engine side.

- Check the low-pressure line to the high pressure pump.

If no fault is found:

- Replace high pressure pump ⇒ [page 220](#).

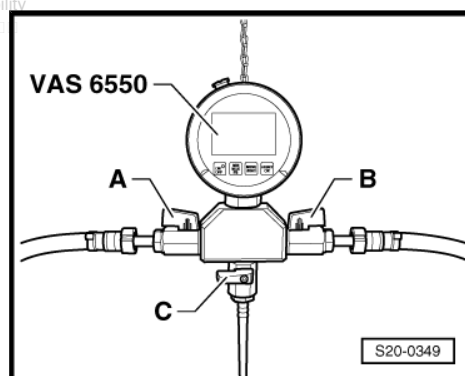
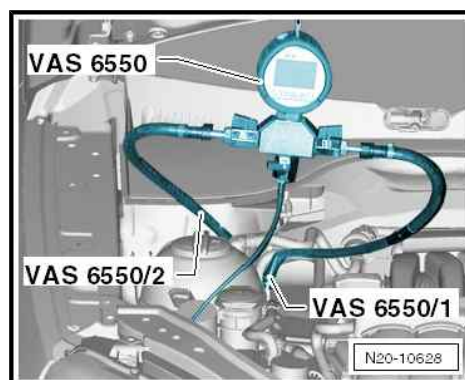
If the pressure again drops:

Search for leakage on the fuel tank side, to do so proceed in the following manner:

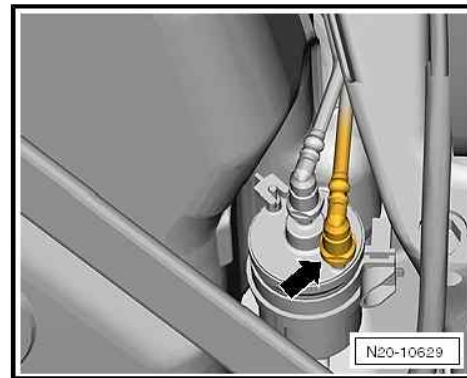
- Check the fuel line to the fuel filter for tightness.

If the fuel line is not found to be faulty:

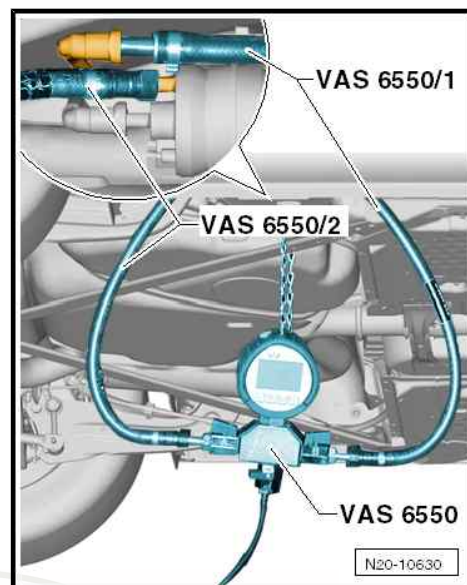
- Check the pressure holding valve in the fuel delivery unit. To do so proceed in the following manner:



- Disconnect fuel feed line -arrow- at fuel filter.



- Connect the pressure gauge -VAS 6550- with the adapter -VAS 6550/1- and -VAS 6550/2- between the fuel filter and the fuel feed line.
- Make sure that the discharge cock is opened and the shut-off cocks are opened.
- Switch the ignition on and off so often until the fuel pressure on the pressure gauge does no longer rise.
- Read off fuel pressure on the pressure gauge.
- Specified value: 0.58 ... 0.70 MPa (5.8 ... 7.0 bar)



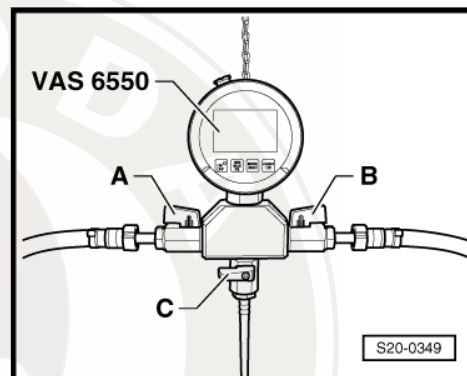
- After the pressure has built up, close the shut-off cock -A-.
- Observe pressure drop at pressure gauge.
- The pressure must not drop below 0.3 MPa (3.0 bar) after 10 minutes.

If the pressure drops:

- Non-return valve in the fuel pump faulty, replace fuel delivery unit ⇒ [page 156](#).

If the pressure does not drop:

- Pressure limiting valve in the fuel filter defective, replace the fuel filter.



1.11.4 Check fuel flow rate



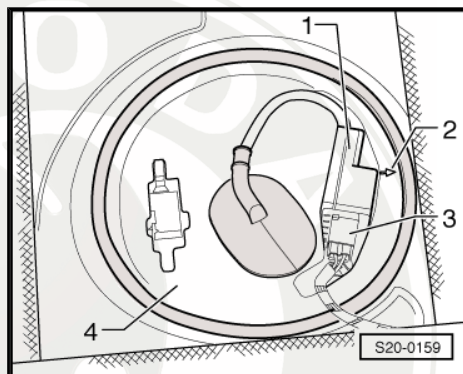
Note

- ♦ *Safety precautions when working on the fuel supply system*
⇒ [page 3](#).
- ♦ *Rules of cleanliness when working on the fuel supply system*
⇒ [page 5](#).

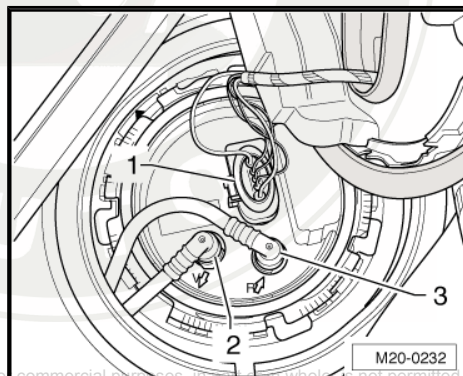
- Switch off the ignition and all electrical components and take out the ignition key.
- Removing rear seat bench ⇒ Body Work; Rep. Gr. 72.

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- Unclip the cover -4- with the fuel pump control unit -J538- -1-.



- First of all check the plug -1- for firm seating, by pulling on the plug, without pressing the locking mechanism. If the plug connection was not correctly positioned, this could cause a fault.
- Unplug connector -1-.
- Check the contacts at the plug and at the fuel delivery unit for damage.

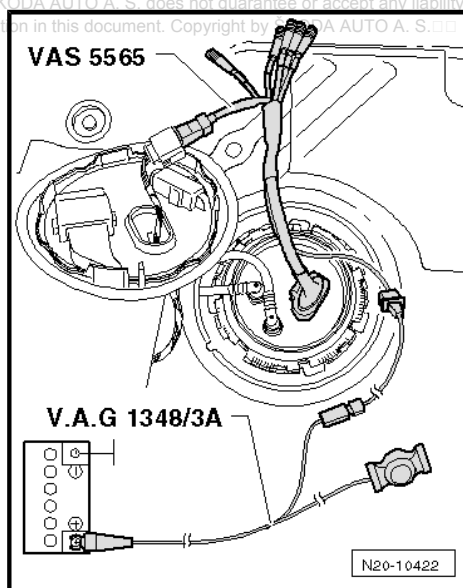


- Connect the adapter for measuring method/DSO (5-pin) -VAS 5565- to the plug connection and to the fuel delivery unit.
- Connect remote control -V.A.G 1348/3A- to adapter -VAS 5565- and to battery positive (+).

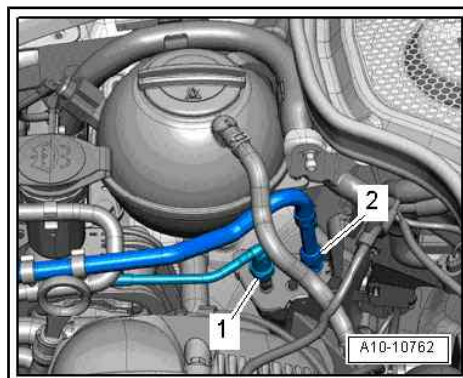


Note

This step is only intended to ensure that the fuel delivery unit runs when the engine is switched off.



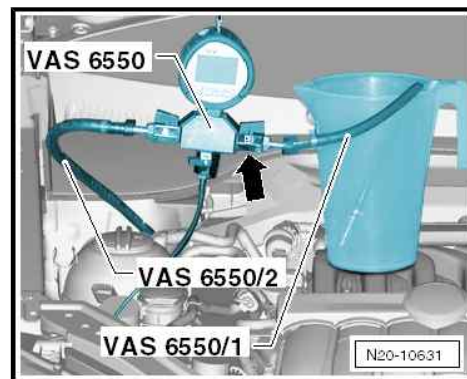
- Remove the fuel feed line -2- (press in the securing ring to the top) and catch the fuel which flows out with a cleaning cloth.



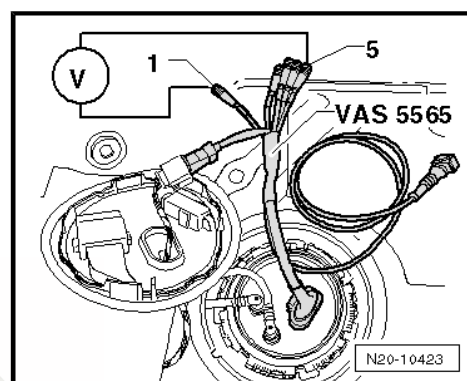
- Connect the pressure gauge -VAS 6550- with the adapter -VAS 6550/2- to the fuel feed line. Hold the adapter -VAS 6550/1- in a measuring vessel.
- Make sure that the discharge cock is opened and the shut-off cocks are opened.

**WARNING**

Danger of liquid spraying out when opening the shut-off valve. Wear safety goggles and safety clothing, in order to avoid injuries and skin contact with fuel. Hold the container in front of the free connection to the pressure gauge.



- Activate remote control -V.A.G 1348/3A - . While doing this, slowly close the cock -arrow- until the pressure gauge displays 0.4 MPa (4 bar) overpressure. Now do not make any further changes to the position of the cock.
- Empty measuring vessel.
- The fuel flow rate of the fuel pump is dependent on the battery voltage. For this reason, additionally connect the multimeter -V.A.G 1715- to the terminals -1 and 5- of the adapter for measuring method/DSO (5-pin) -VAS 5565- .
- Activate the remote control for 30 seconds while measuring the voltage at the fuel pump.



- Compare the delivered fuel rate with the specified value.

*) minimum flow rate 1 cm³/30 s

**) Voltage at the fuel pump when engine not running and delivery unit operating.

Read out examples:

During the test a voltage of 10.5 V was measured. Thus a minimum flow rate of 580 cm³/30 s is obtained.

If the minimum delivery volume is not reached:

- Check the fuel lines for possible restrictions (kinks) or blocking.

If no fault is found:

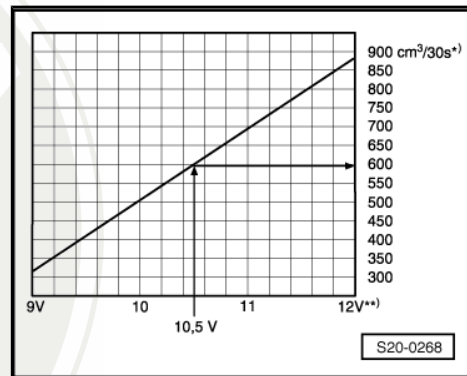
- Take cap off fuel filler neck and repeat the test.

If the fuel flow rate is now reached:

- Check the ventilation of the fuel tank.

If the minimum flow rate is again not reached:

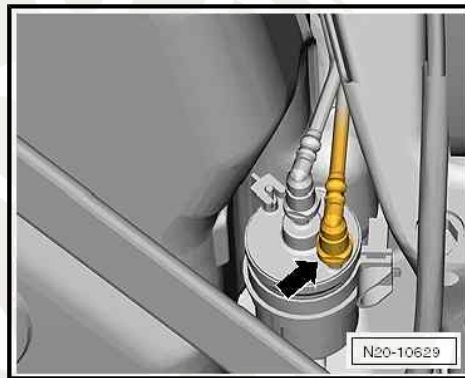
- Check the fuel filter, to do so proceed as follows:



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- Disconnect fuel feed line -arrow- at fuel filter.



- Connect the pressure gauge -VAS 6550- with the adapter -VAS 6550/1- to the fuel feed line. Hold the adapter -VAS 6550/2- in a measuring vessel.
- Make sure that the discharge cock is opened and the shut-off cocks are opened.
- Repeat fuel flow rate test.

If the minimum flow rate is now reached:

- Replace fuel filter.

If the minimum flow rate is again not reached:

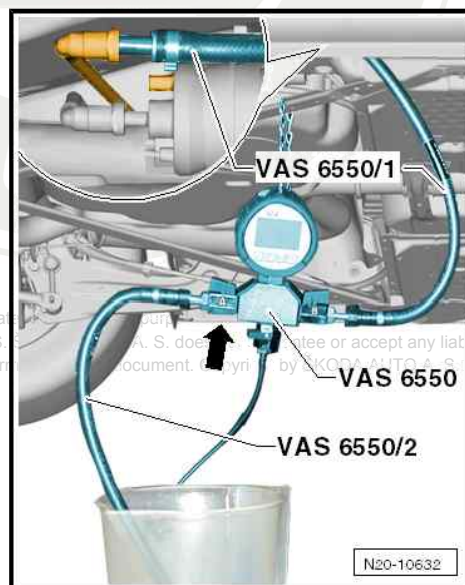
- Remove fuel delivery unit and inspect the filter strainer for soiling.

If you have still not found any fault up to this stage:

- Replace fuel delivery unit ⇒ [page 156](#) .

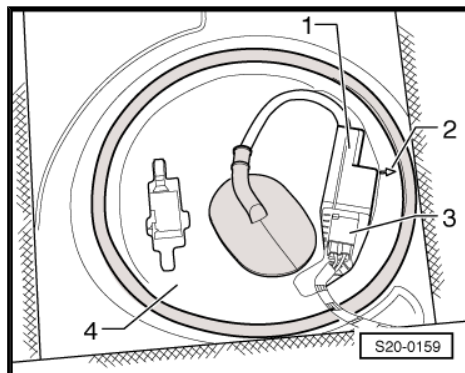
If the required fuel delivery volume was reached, but a fault is still suspected in the fuel supply system (e.g. intermittent breakdown of the fuel supply).

- Check power consumption of the fuel pump ⇒ [page 168](#) .



1.11.5 Check power consumption

- Fold up rear seat.
- Unclip the cover -4- with the fuel pump control unit -J538- -1-.

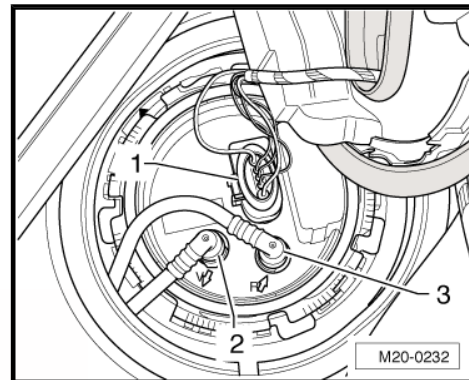




- First of all check the plug -1- for firm seating, by pulling on the plug, without pressing the locking mechanism. If the plug connection was not correctly positioned, this could cause a fault.
- Unplug connector -1-.
- Check the contacts at the plug and at the fuel delivery unit for damage.

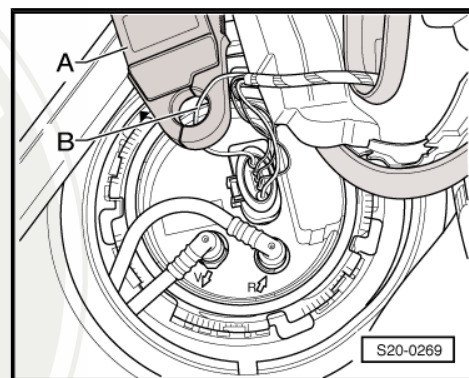
If no damage was detected:

- Fit again plug -1-.



- Connect the current probe -A- of the vehicle diagnosis system, measurement and information system -VAS 505X- on the line -B- to contact 1 of the 5-pin plug.

If the current probe cannot be connected on the line -B- to contact 1 of the 5-pin plug because of the length of the insulation:



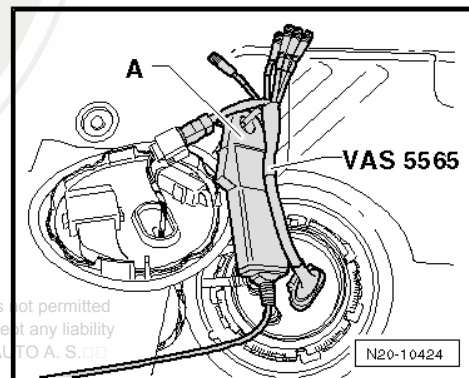
- Connect the adapter for measuring method/DSO (5-pin) -VAS 5565- to the plug connection and to the fuel delivery unit.
- Connect the current probe -A- to the red cable - with the lettering "current probe" - of the adapter for measuring method/DSO (5-pin) -VAS 5565-.

Continued for all

- Start engine and run in idle.
- Measure voltage consumption of the fuel pump.

Specified value: max. 9 A

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Note

If the fault in the fuel supply system is intermittent then tests can be undertaken during a test drive but then two people are required for this.

If the specified current uptake is exceeded:

- Fuel pump defective, replace the fuel delivery unit
⇒ [page 156](#).

1.12 Removing and installing fuel gauge sender 2 -G169- for vehicles with four-wheel drive

Special tools and workshop equipment required

- ◆ Key -T30101 (3087) -
- The fuel tank must not be more than $\frac{1}{2}$ full.

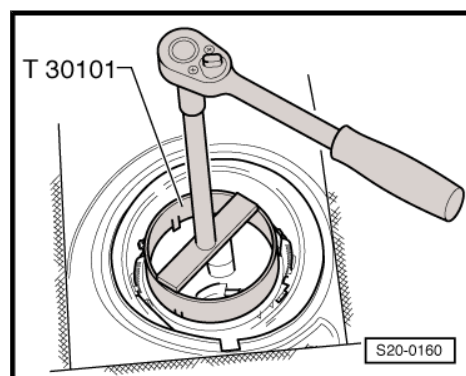


Note

- ◆ If necessary, extract fuel from the fuel tank ⇒ [page 144](#) .
- ◆ Safety precautions when working on the fuel supply system
⇒ [page 3](#) .
- ◆ Rules of cleanliness when working on the fuel supply system
⇒ [page 5](#) .
- ◆ Make sure that the float arm of the fuel gauge sender -2- -
G169- is not bent.

Removing

- Switch off all electrical components and withdraw key from ignition key housing.
- Removing rear seat bench ⇒ Body Work; Rep. Gr. 72 .
- Remove the left cover in direction of travel from the sender for the fuel gauge display -2- -G169- .
- Separate the electrical plug connection.
- Unlock lock ring with the wrench -T30101- .



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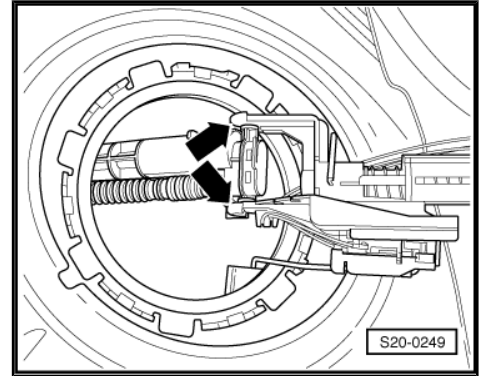
- Slightly pull fuel gauge sender 2 -G169 - out of the opening of the fuel tank, release catches -arrows- and disconnect suction jet pump.
- Remove gasket ring.

Install



Caution

When installing do not bend the float arm of the fuel gauge sender -2- -G169 - .



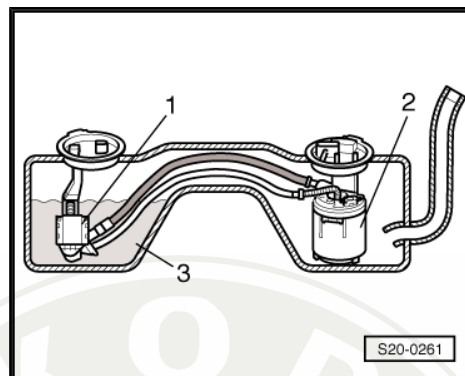
- Insert the fuel gauge sender 2 -G169 - into the fuel tank.
- Position the suction jet pump in the inside of the fuel tank onto the sender. The catches must click audibly.
- Insert new dry gasket ring of the flange into the opening of the fuel tank and only now moisten the inside (towards flange) with fuel.
- Pay attention to the fitting location of the fuel gauge sender -2- -G169- → [page 143](#) .
- Check correct seating of the gasket ring.
- Tighten lock ring with wrench for union nut -T30101- .
Tightening torque: 110 Nm
- Mount the plug connection.
- Install cover.
- Install rear seat bench ⇒ Body Work; Rep. Gr. 72 .

1.13 Removing and installing suction jet pump for vehicles with four-wheel drive



Note

- ◆ The fuel tank for four-wheel drive vehicles consists of a left and right chamber. In order to pump the fuel out of the left chamber -3- of the fuel tank into the right chamber to the housing of the delivery unit -2-, a suction jet pump -1- is required.
- ◆ The version of the fuel tank requires that the fuel is pumped from the area of the fuel gauge sender -2- -G169- with a suction jet pump to the fuel delivery unit.
- ◆ A check is only to be carried out, if the engine stops because of fuel shortage, although the fuel gauge still indicates a fuel tank which is $\frac{1}{4}$ full.



Work procedure

- Remove fuel delivery unit:
- ◆ for vehicles up to MY 2008 ➔ [page 153](#)
- ◆ for vehicles as of MY 2009 ➔ [page 156](#)
- Remove fuel gauge sender 2 -G169- ➔ [page 169](#) .
- Now the suction jet pump can be pulled out from the side of the fuel gauge sender 2 -G169- (left vehicle side).
- Check if the fuel lines are firmly connected to the suction jet pump and are not damaged.
- Check the suction jet pump additionally for possible contamination.

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2 Electronic Engine Power Control (Electronic throttle)

2.1 Accelerator pedal module - Summary of components

1 - Connector

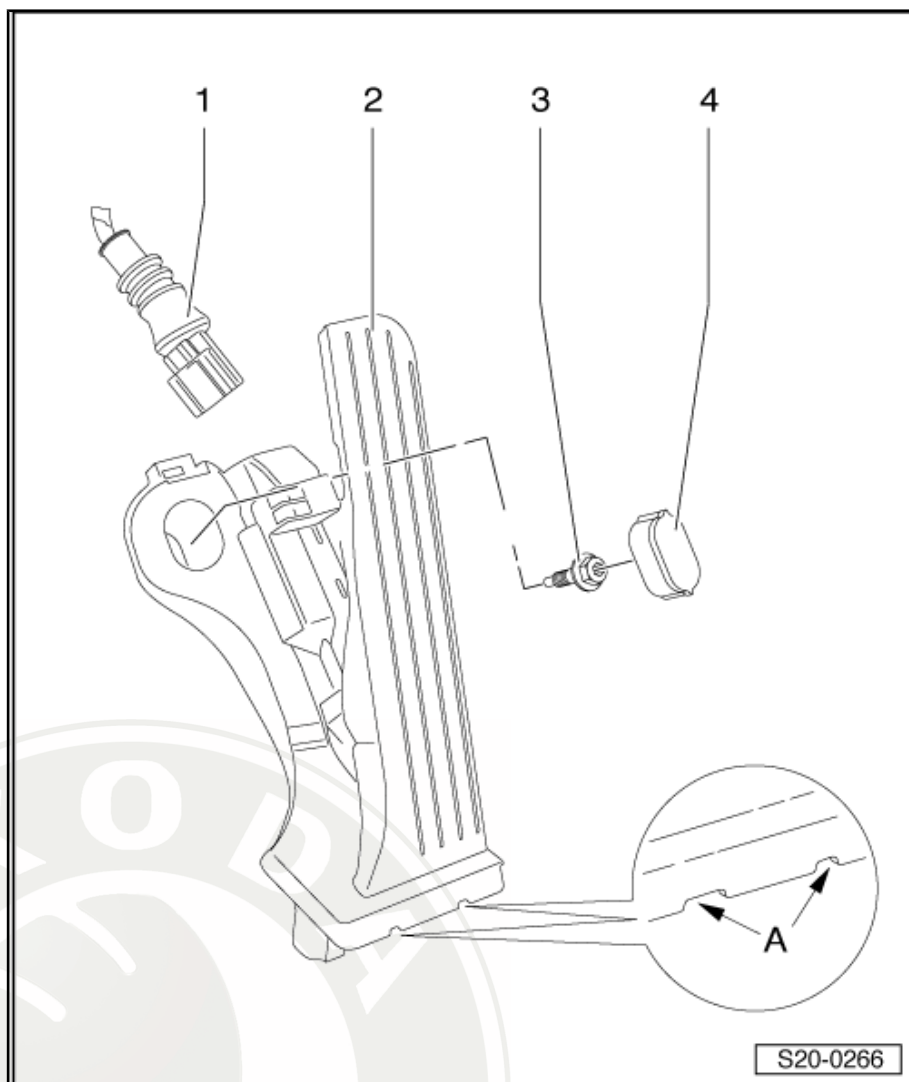
- ☐ black, 6 pin
- ☐ disconnect and fit on
⇒ [page 175](#)

2 - Accelerator pedal module

- ☐ with accelerator pedal position sender -G79- and accelerator pedal position sender 2 -G185-
- ☐ for vehicles with automatic gearbox with kick-down switch
- ☐ not adjustable
- ☐ -A- openings for the release tool
- ☐ removing and installing
⇒ [page 173](#)
- ☐ when replacing, the engine control unit must be adapted on vehicles with automatic gearbox
⇒ Vehicle diagnosis, testing and information system VAS 5051

3 - 10 Nm

4 - Cap



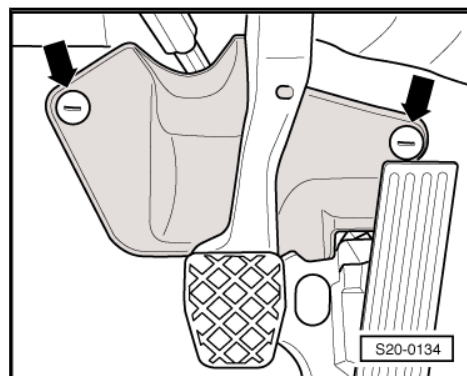
2.2 Removing and installing accelerator pedal module

Special tools and workshop equipment required

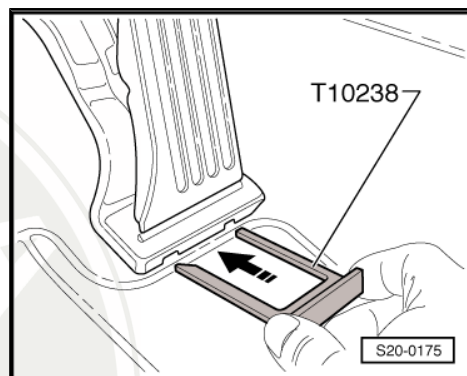
- ◆ Release tool -T10238- (for left-hand drive vehicle)
- ◆ Release tool -T10240- (for right-hand drive vehicle)

Removing

- Remove steering column cover -arrows-.
- Lever out the cap (➔ [page 173](#) , Pos. 4) with a screwdriver.
- Release fixing screw (➔ [page 173](#) , Pos. 3).

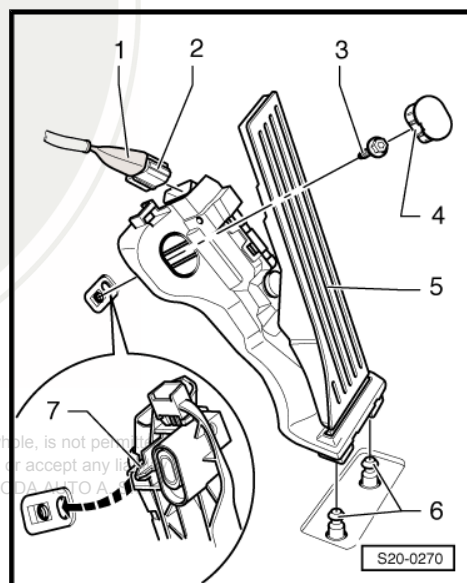


- Push the release tool -T10238 - (on right-hand drive vehicles release tool -T10240 -) as shown up to the stop into the provided openings and remove the accelerator pedal module.
- Disconnect connector at accelerator pedal module ➔ [page 175](#) .



Install

- Fit the connector -2- onto the accelerator pedal module -5- ➔ [page 175](#) .
- Push accelerator pedal module onto fixing bolts -6-.
- Insert the centering pin -7- into the hole on the underbody.
- Fasten accelerator pedal module with screw -3- (10 Nm) and fit on cap -4-.
- Re-install steering column cover.
- If the accelerator pedal module was replaced on vehicles with automatic gearbox, the engine control unit must be adapted ➔ Vehicle diagnosis, testing and information system VAS 5051.



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2.2.1 Disconnect connector for accelerator pedal module and fit on



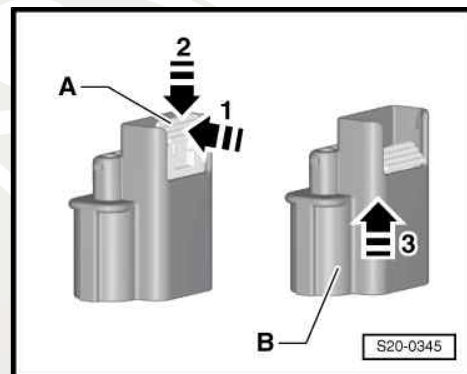
Note

The plugs for the accelerator pedal module which are inserted, must be disconnected and fit on in a different manner.

Disconnect connector 1K0 973 706

- Slightly press the piston slide valve -A- (grey) in -direction of arrow 1- and push it up to the stop in -direction of arrow 2-.
- Hold the piston slide valve in this position and disconnect the socket housing -B- towards the top in -direction of arrow 3-.

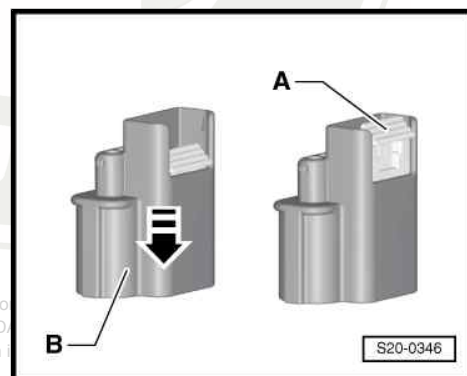
The piston slide valve -A- remains in the bottom position.



Fit on connector 1K0 973 706

- Push the socket housing -B- down in -direction of arrow- until the housing can be heard to lock in place.
- For safety reasons, check the connector for secure catch by tightening it in the opposite direction.

The piston slide valve -A- moves automatically upwards.

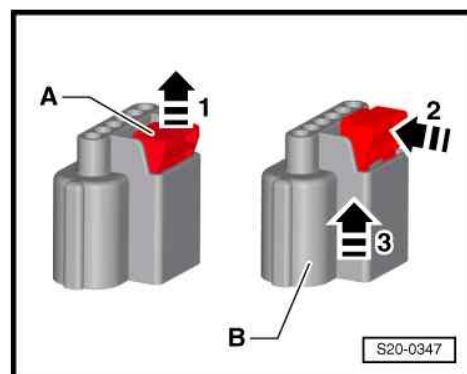


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Disconnect connector 8K0 973 706

- Pull the piston slide valve -A- (red) upwards in -direction of arrow 1- up to the stop.
- Press the piston slide valve in -direction of arrow 2- and disconnect the socket housing -B- upwards in -direction of arrow 3-.

The piston slide valve -A- remains in the top position.

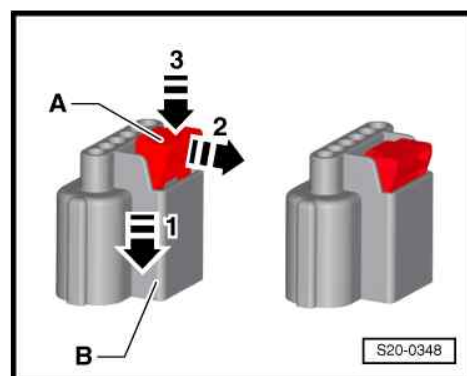


Fit on connector 8K0 973 706

- Push the socket housing -B- downwards up to the stop in -direction of arrow 1-.
- Slightly press the piston slide valve in -direction of arrow 2- and push it downwards in -direction of arrow 3-.

The piston slide valve -A- can only be pushed downwards if the socket housing was pushed downwards "up to the stop".

- For safety reasons, check the connector for secure catch by tightening it in the opposite direction.



3 Activated charcoal container system

3.1 Activated charcoal container system - Summary of components



Note

- ◆ The hose connections are secured with spring strap clips or clamp-type clips.
- ◆ Always replace clamp-type clips with spring-type clips.
- ◆ Use pliers for spring strap clips to fit the spring strap clips.
- ◆ Safety precautions when working on the fuel supply system ⇒ [page 3](#).
- ◆ Rules of cleanliness when working on the fuel supply system ⇒ [page 5](#).

1 - Activated charcoal filter

- ☐ Fitting position: in right of engine compartment
- ☐ if the catch peg is unlocked, the activated charcoal filter can be removed from the holder
- ☐ Checking the fuel tank venting ⇒ [page 177](#)

2 - Pressure holding valve with connection hose

3 - 8 Nm

4 - Connecting hose

- ☐ check for firm seating
- ☐ press in the securing ring for the separation.

5 - from fuel tank

6 - 8 Nm

7 - 5 Nm

8 - Support

- ☐ for activated charcoal filter

9 - from exhaust turbocharger

10 - To intake manifold

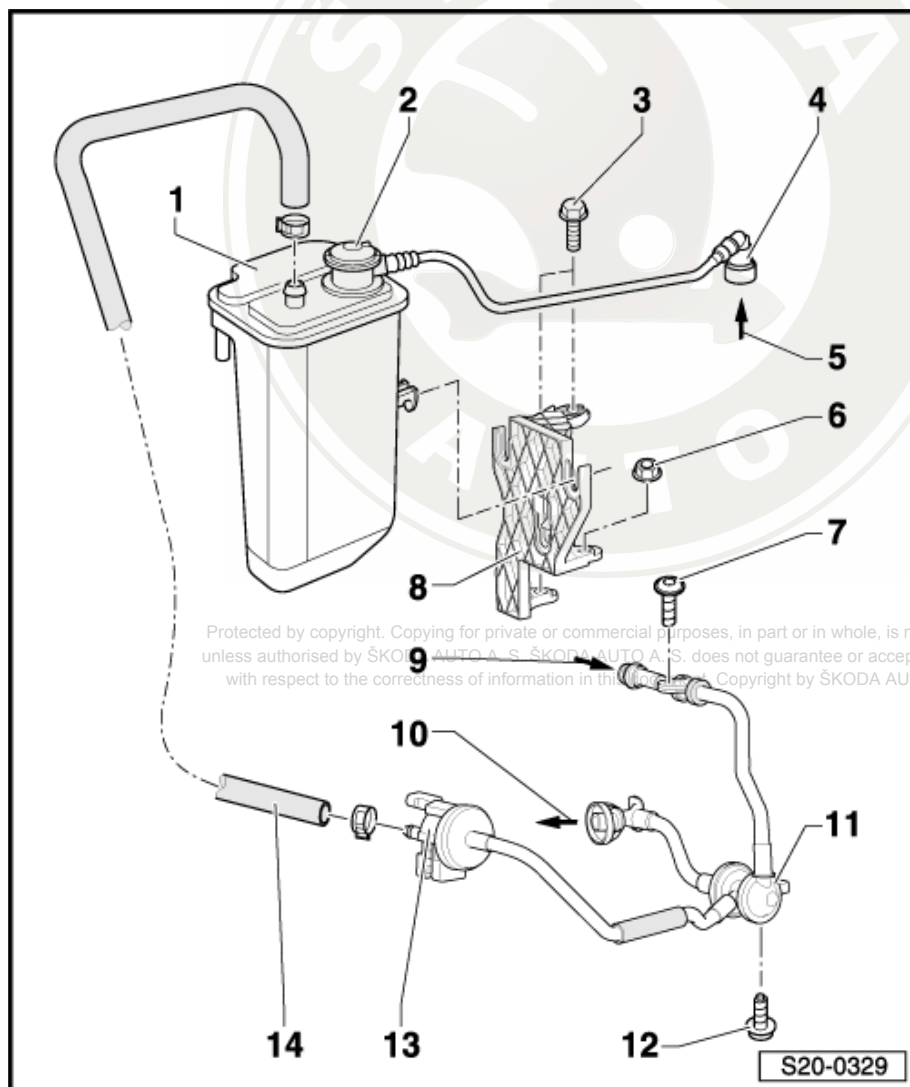
11 - Double non-return valve

- ☐ attached to intake manifold ⇒ [page 203](#)
- ☐ a component with activated charcoal filter solenoid valve 1 - N80-

12 - 12 Nm

13 - Solenoid valve 1 for activated charcoal filter -N80-

- ☐ Valve closed when ignition is switched off
- ☐ valve is actuated (pulsed) by engine control unit when engine is warm
- ☐ a component with double non-return valve



14 - Connecting hose

3.2 Checking the fuel tank venting

Special tools and workshop equipment required

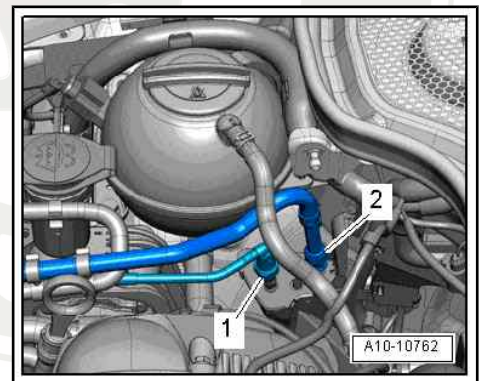
- ◆ Hand vacuum pump , e.g. -V.A.S 6213-
- ◆ Adapter -V.A.G 1318/17-
- ◆ Adapter for K-Jetronic tester -V.A.G 1318/20-1-

Test condition

- The ignition must be switched off.

Test sequence

- Detach vent line -1-. To do so press in the securing ring.



- Then connect the hand vacuum pump -V.A.S 6213- -1- on the vent line -2- as shown.

- Operate the hand vacuum pump -V.A.S 6213- several times.

- No vacuum should build up.

If a vacuum builds up.

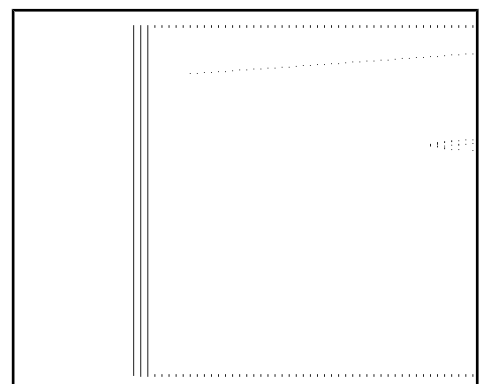
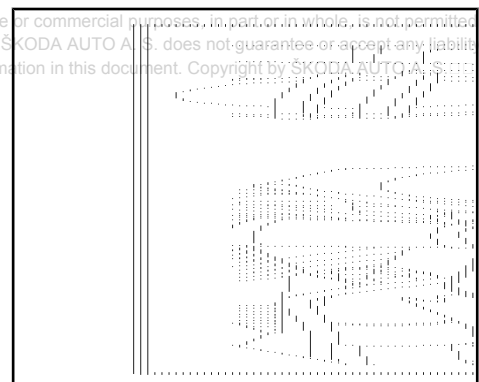
- Check the air admission fitting on the activated charcoal filter for dirt and clean as required.

If no vacuum builds up:

- Shut off air admission fitting -arrow- and once again operate the vacuum pump several times. A vacuum should build up.

If no vacuum builds up:

- Replace activated charcoal filter.



21 – Turbocharging

1 Exhaust gas turbocharger



Note

Observe the general notes for assembly work on the charge air system with exhaust gas turbocharger ⇒ [page 7](#).

1.1 Exhaust turbocharger - Summary of components

Part 1 for engine identification characters BZB, CDAA, CDAB

1 - Exhaust gas turbocharger

- ☐ can only be replaced with exhaust manifold and pressure box
- ☐ removing and installing ⇒ [page 182](#)

2 - To intake manifold

3 - Pressure box for turbocharger

- ☐ Inspect proper operation ⇒ [page 187](#)
- ☐ removing and installing ⇒ [page 189](#)
- ☐ adjust ⇒ [page 190](#)

4 - Sealing ring

- ☐ replace

5 - Connection fittings

6 - Hollow screw

- ☐ 8 Nm

7 - Hose

8 - Hose

9 - 3 Nm

10 - Solenoid valve for charge pressure control -N75 -

11 - Hose

12 - Sealing ring

- ☐ replace

13 - Supports

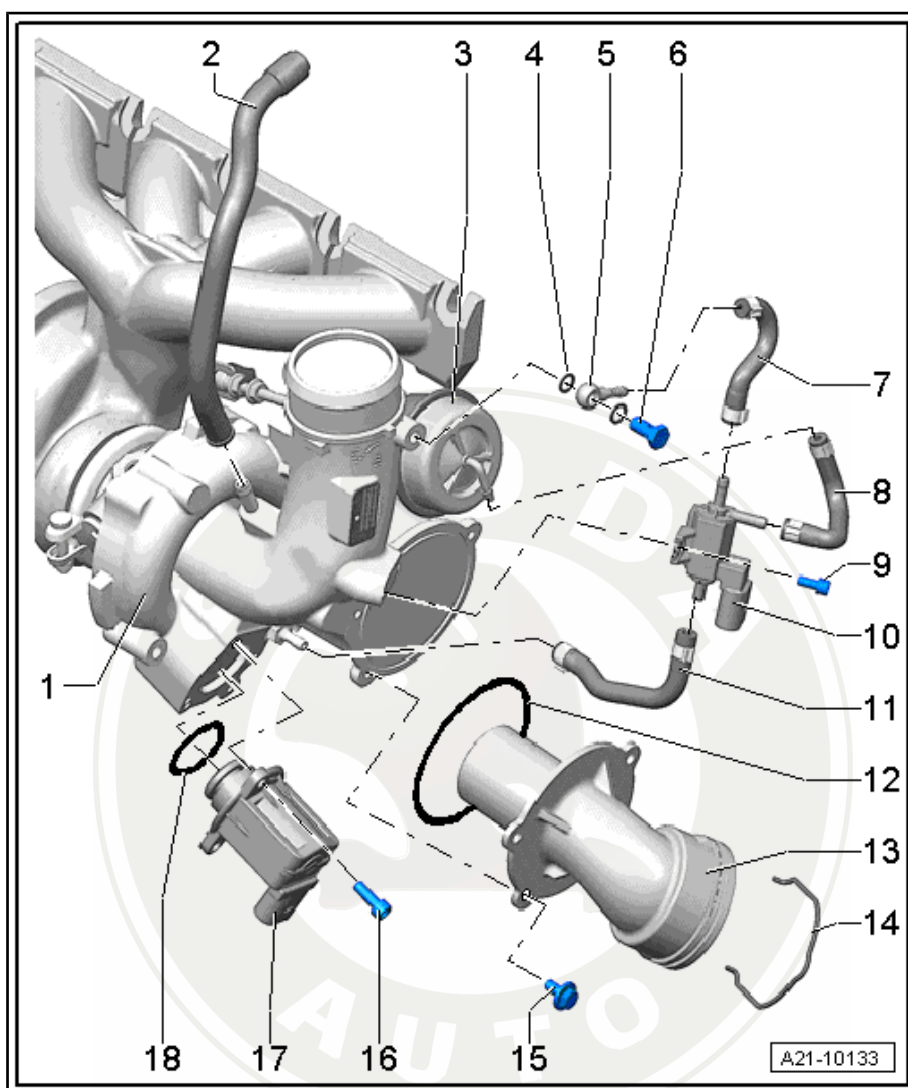
14 - Locking clip

15 - 9 Nm

16 - 7 Nm

17 - Turbocharger divert air valve -N249-

- ☐ pay attention to correct installation position ⇒ [page 180](#)



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18 - Sealing ring

- ☐ replace

Part 1 for engine identification characters CCZA

1 - Exhaust gas turbocharger

- ☐ can only be replaced with exhaust manifold and pressure box
- ☐ removing and installing
⇒ [page 182](#)

2 - To intake manifold

3 - Pressure box for turbo-charger

- ☐ Inspect proper operation
⇒ [page 187](#)
- ☐ removing and installing
⇒ [page 189](#)
- ☐ adjust ⇒ [page 190](#)

4 - Hose

5 - Hose

6 - 3 Nm

7 - Solenoid valve for charge pressure control -N75 -

8 - Hose

9 - Supports

10 - Locking clip

11 - 9 Nm

12 - Sealing ring

- ☐ replace

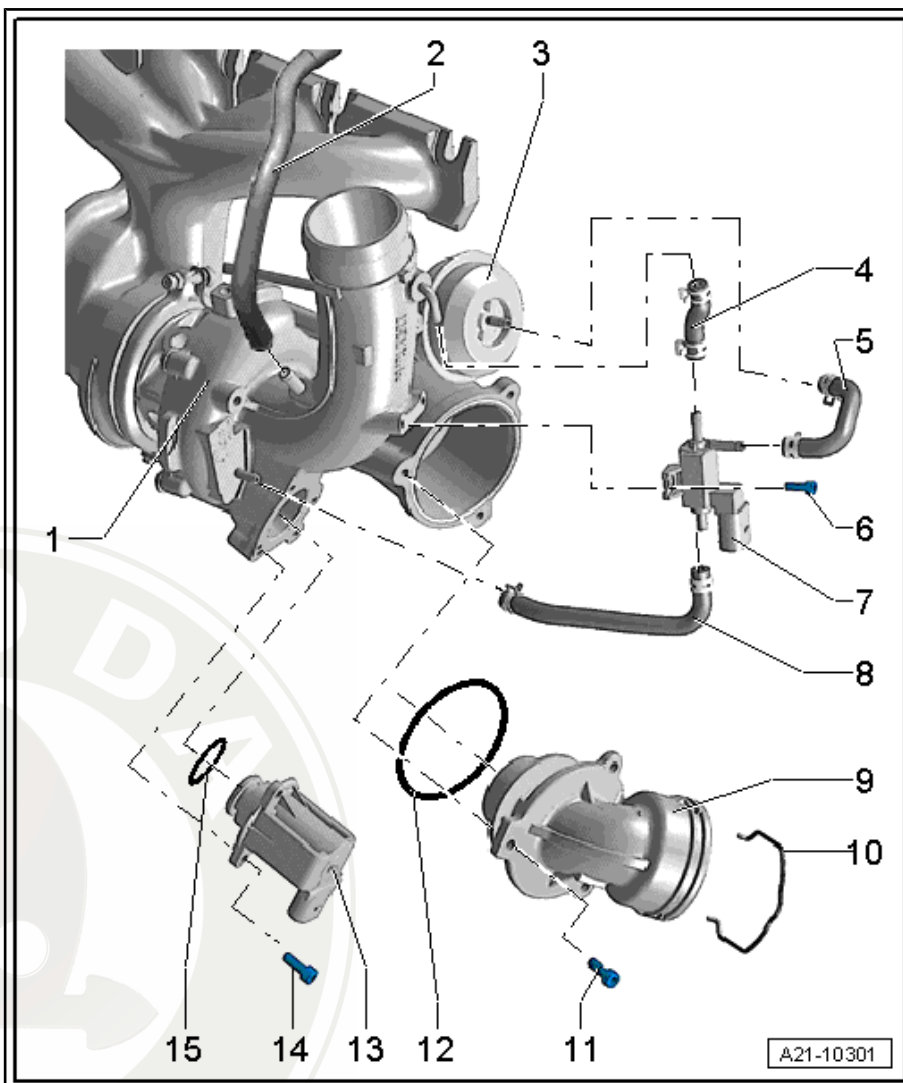
13 - Turbocharger divert air valve -N249-

- ☐ pay attention to correct installation position
⇒ [page 180](#)

14 - 7 Nm

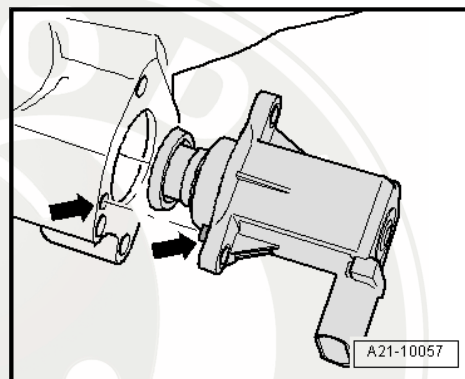
15 - Sealing ring

- ☐ replace



Fitting position turbocharger divert air valve -N249-

- Check fitting position -arrows-.



Part 2

1 - Sealing ring

- ☐ replace

2 - 20 Nm + torque a further 45° (1/8 turn)

3 - Oil feed line

4 - Exhaust gas turbocharger

- ☐ can only be replaced with exhaust manifold and pressure box
- ☐ removing and installing
⇒ [page 182](#)

5 - 9 Nm

6 - 9 Nm

7 - Sealing ring

- ☐ replace

8 - 20 Nm + torque a further 45° (1/8 turn)

9 - 9 Nm

10 - 20 Nm + torque a further 45° (1/8 turn)

11 - Sealing ring

- ☐ replace

12 - Coolant feed line

13 - O-ring

- ☐ replace

14 - 9 Nm

- ☐

15 - Gasket

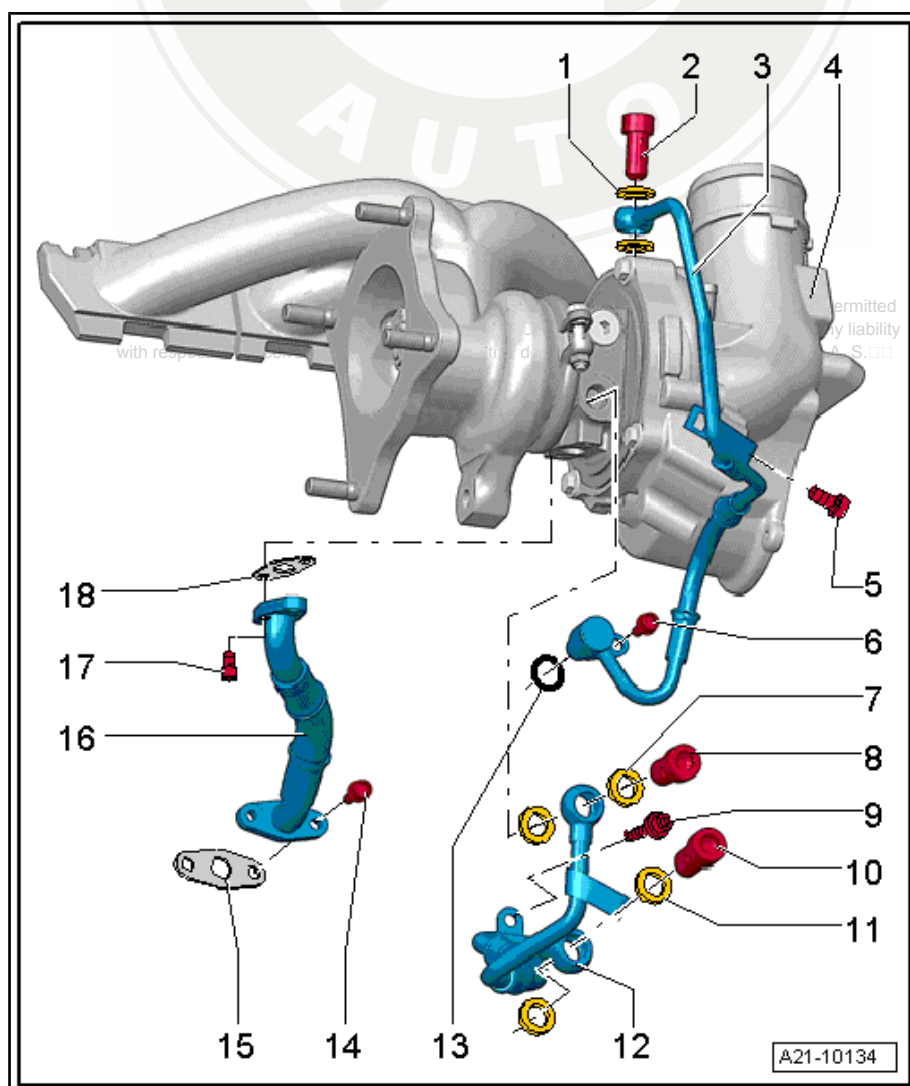
- ☐ replace

16 - Oil return-flow line

17 - 9 Nm

18 - Gasket

- ☐ replace



Part 3

1 - Gasket

- ☐ replace

2 - Nut

- ☐ replace
- ☐ order of tightening
⇒ [page 181](#)
- ☐ Coat pin screws of cylinder head with hot bolt paste -G 052 112 A3-

3 - 20 Nm + torque a further 45° (1/8 turn)

4 - Sealing ring

- ☐ replace

5 - Coolant return-flow line

6 - 9 Nm

7 - Exhaust gas turbocharger

- ☐ can only be replaced with exhaust manifold and pressure box
- ☐ removing and installing
⇒ [page 182](#)

8 - Support

9 - 30 Nm

- ☐ Coat bolt with hot bolt paste -G 052 112 A3-

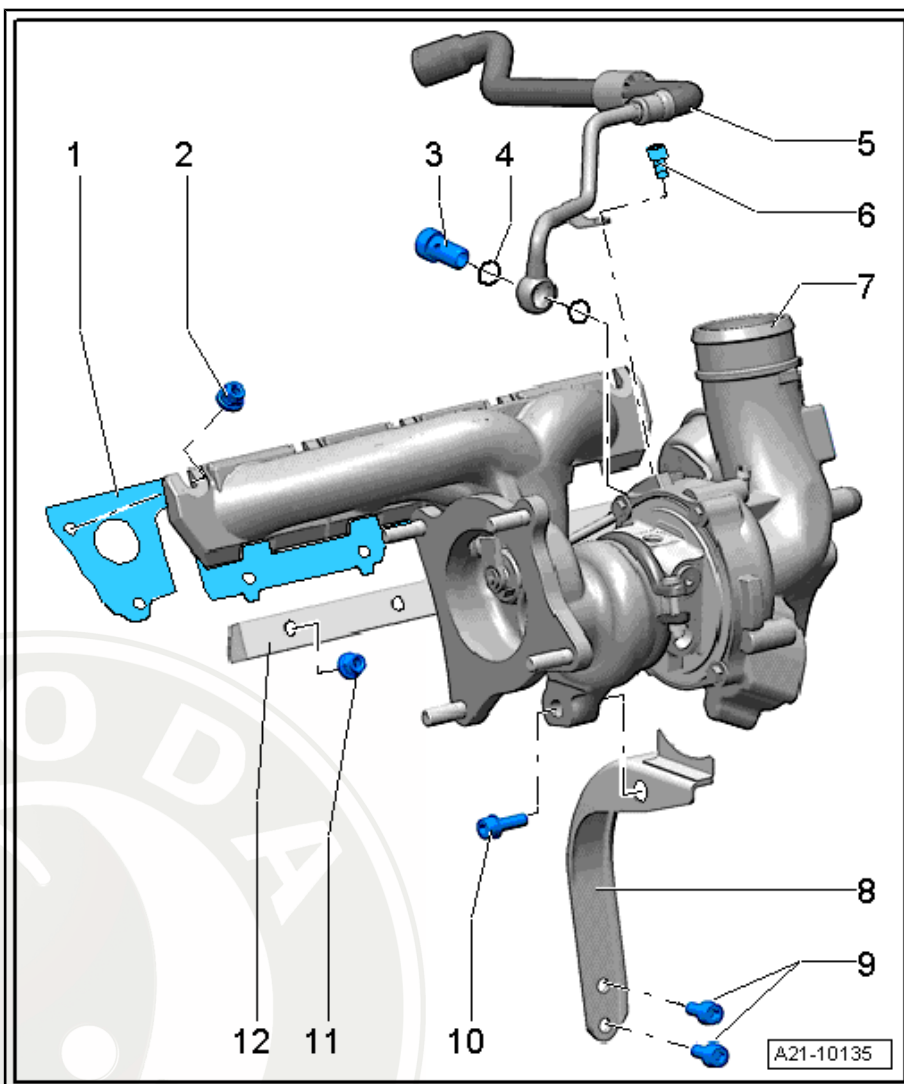
10 - 30 Nm

- ☐ Coat bolt with hot bolt paste -G 052 112 A3-

11 - 30 Nm

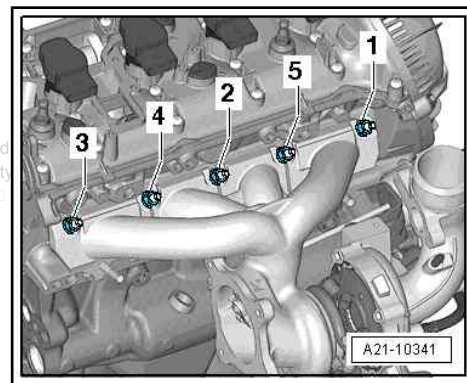
- ☐ replace
- ☐ do not slacken for the removal of the exhaust turbocharger
- ☐ Coat pin screws of cylinder head with hot bolt paste -G 052 112 A3-

12 - Clamping strip



Exhaust gas turbocharger - tightening sequence

- Tighten the screws -1 to 5- in 4 stages as follows:
- 1. Tighten the screws to 5 Nm.
- 2. Tighten the screws to 12 Nm.
- 3. Tighten the screws to 16 Nm.
- 4. Tighten the screws to 25 Nm.



Part 4



Note

An adjustable pressure box is installed only on engines with identification characters BZB, CDAA, CDAB.

1 - Exhaust gas turbocharger

- ☐ can only be replaced with exhaust manifold and pressure box
- ☐ removing and installing
⇒ [page 182](#)

2 - Pressure box for turbo-charger

- ☐ Inspect proper operation
⇒ [page 187](#)
- ☐ removing and installing
⇒ [page 189](#)
- ☐ adjust, only on engines with identification characters BZB, CDAA, CDAB ⇒ [page 190](#)

3 - 10 Nm

4 - 9 Nm

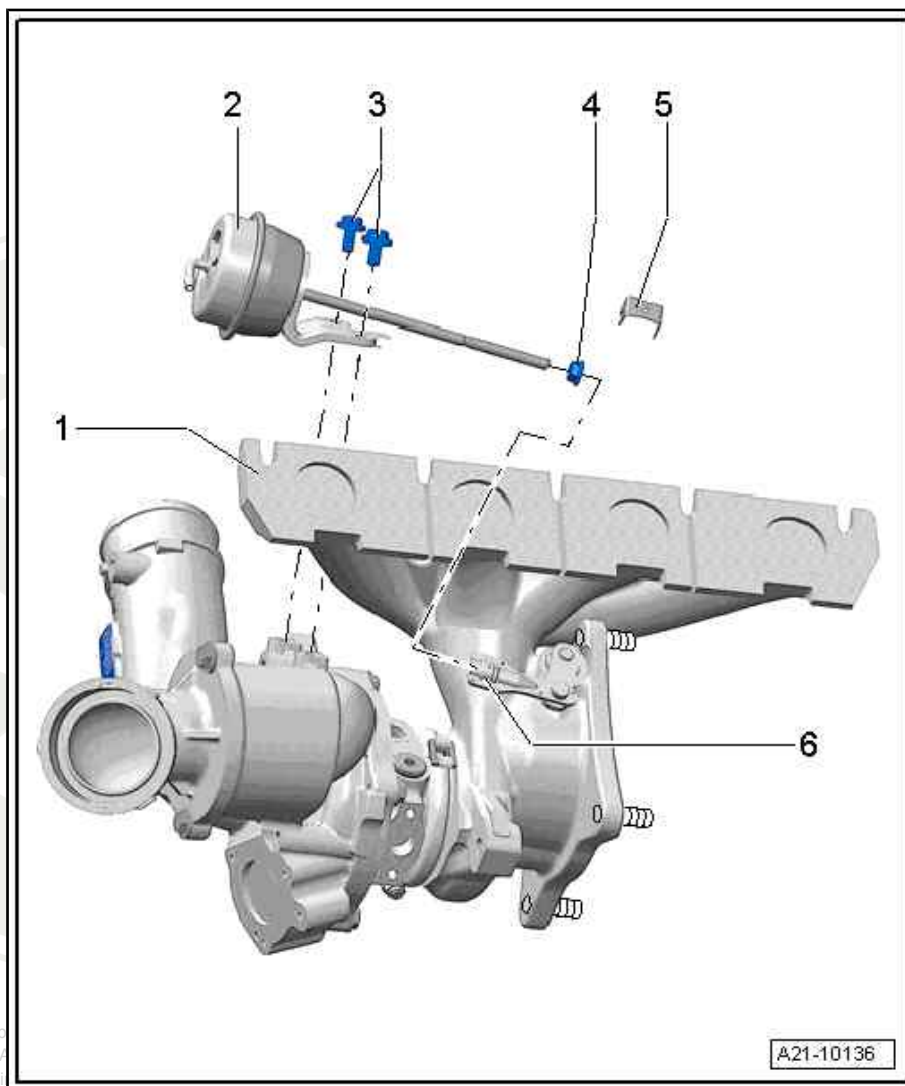
- ☐ only on engines with identification characters BZB, CDAA, CDAB
- ☐ secure with seal paint; seal paint ⇒ Electronic Catalogue of Original Parts

5 - Lock washer

- ☐ only on engines with identification characters BZB, CDAA, CDAB

6 - Knurled nut

- ☐ only on engines with identification characters BZB, CDAA, CDAB



1.2 Removing and installing exhaust gas turbocharger

Special tools and workshop equipment required

- ◆ Pliers for spring strap clamps



Caution

In case a mechanical damage to the exhaust gas turbocharger is found, e.g. damage to the compressor wheel, it is not sufficient to only replace the turbocharger. In order to avoid consequential damage, perform the following tasks:

- ◆ *Clean all oil lines.*
- ◆ *Change engine oil and oil filter.*
- ◆ *Inspect the air filter housing, the air filter element and the intake hoses for contaminations.*
- ◆ *Inspect the whole charge-air routing and the charge air cooler for foreign bodies.*

If foreign bodies are detected in the charge air system, the complete charge-air routing must be cleaned and if necessary the charge air cooler must also be replaced.

Removing

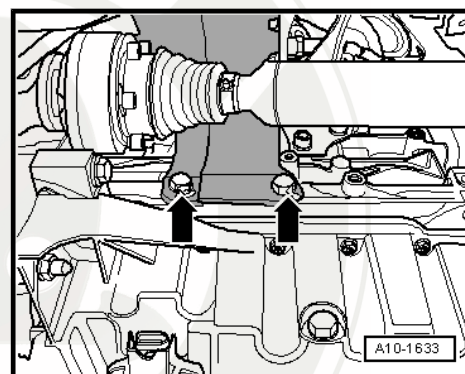
- Drain coolant ➔ [page 114](#) .
- Remove the front right wheelhouse liner ➔ Body Work; Rep. Gr. 66 .

Vehicles with front-wheel-drive

- Unbolt heat shield for right drive shaft -arrows-.

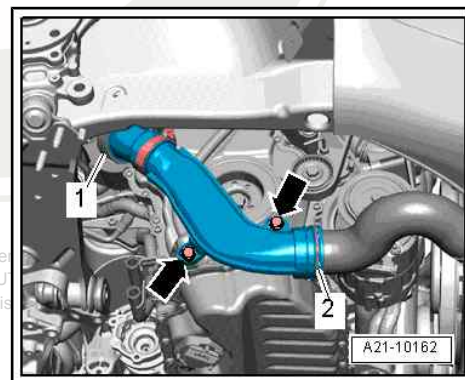
Continued for all vehicles

- Remove pre-exhaust pipe ➔ [page 237](#) .



- Screw out screws -arrows-.
- Remove charge-air pipe, to do so lift retaining clips -1 and 2-.

Vehicles with four-wheel drive

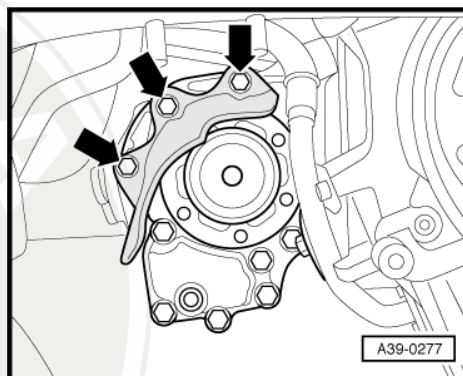


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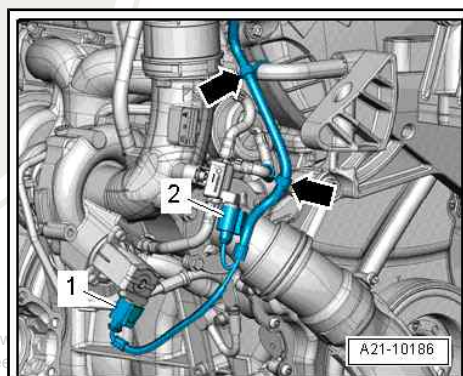
- Remove screws of cap for drive shaft.

Continued for all vehicles



- Disconnect plug connections -1 and 2- and expose electrical cable -arrows-.

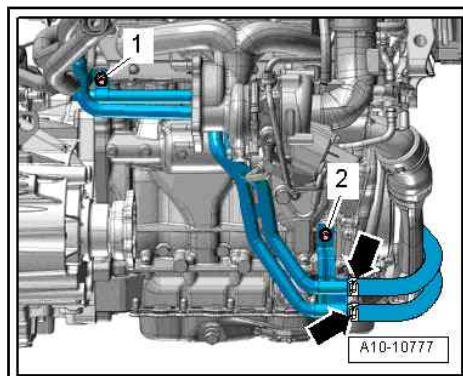
Vehicles with auxiliary heating.



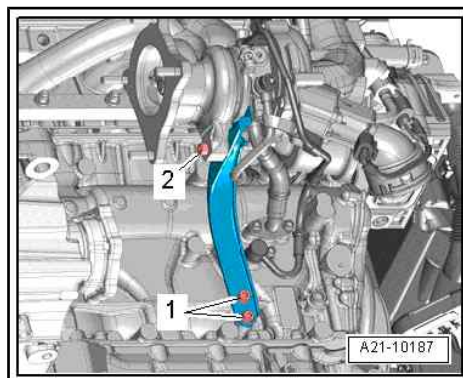
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- Release screws -1 and 2- and swivel coolant pipes to the left.

Continued for all vehicles



- Release screws -1 and 2- and remove support for turbocharger.



- Release the hollow screw -2- and lay the coolant line to the side.

Vehicles with front-wheel-drive

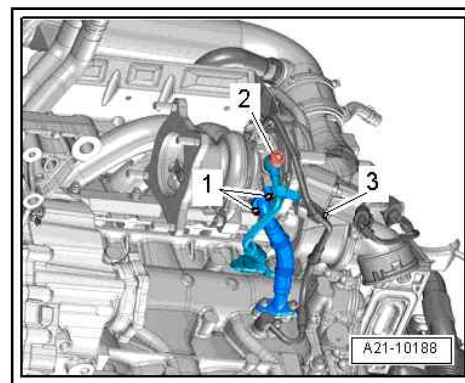
- Release screws -1- to the oil return-flow line.

Vehicles with four-wheel drive

- Release screws of oil return line at cylinder block.

Continued for all vehicles

- Release screw -3- to the oil feed line.



Note

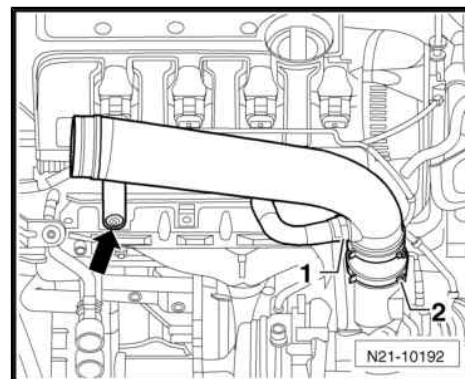
To provide a clearer illustration, the fitting position is shown with the engine removed.

- Pull off ventilation tube -1- for crankcase ventilation.
- Release screw -arrow-.
- Remove intake manifold, to do slacken hose clamp -2-.

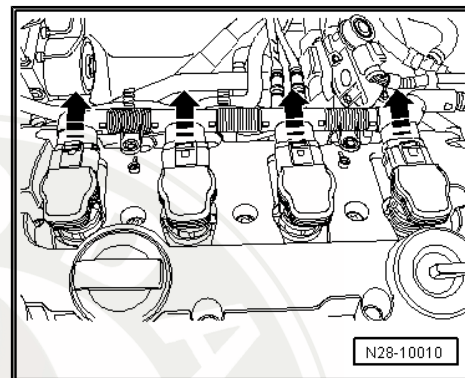


Note

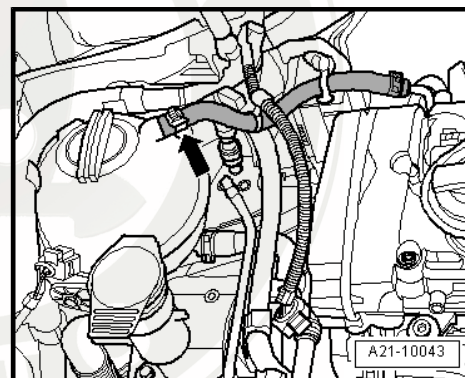
Seal inlet connection at turbocharger.



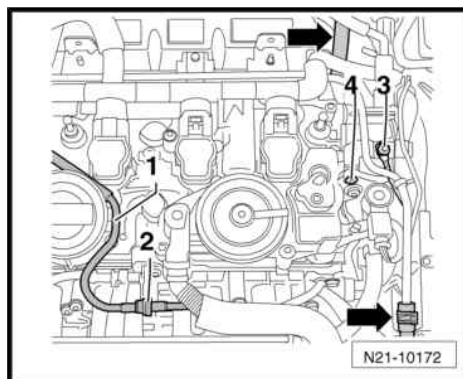
- Disconnect the plug from the ignition coils and place the wiring harness to the side.



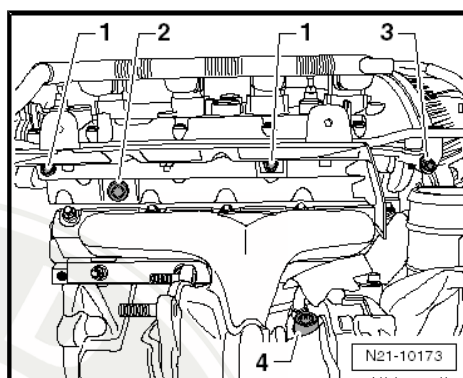
- Disconnect the coolant line to the coolant expansion reservoir -arrow-.



- Disconnect the vacuum line -1- at the separation point -2- and expose the line.
- Remove the coolant hoses -arrows- from the coolant pipe.
- Unbolt earth strap -3- and unscrew the screw -4-.

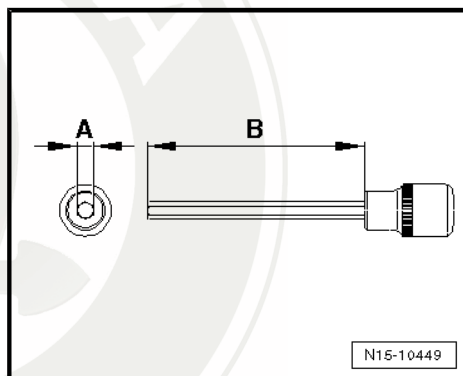


- Unscrew screws -1 to 3- and remove the heat shield together with the coolant pipe.

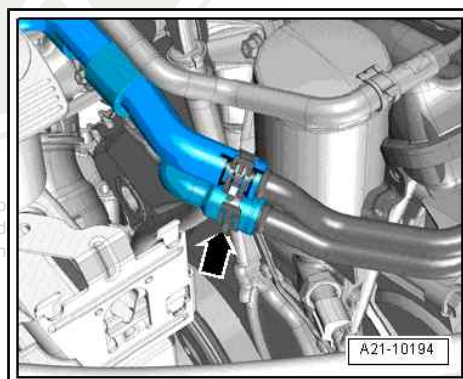


Note

On 2.0 ltr. engines, release the screw -2- from the heat shield using an adapter with a hexagon of 6 mm -A-. The shape of the hexagon must be at least 5 cm long -B-. The adapter, which narrows at the tip to 6 mm, is too thick.



- Separate coolant hose -arrow- and expose.



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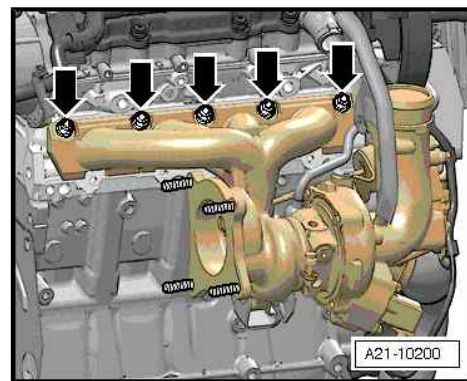


- Unscrew the nuts -arrows-.
- Lift turbocharger up and out.

Install

Installation is carried out in the reverse order. Pay attention to the following:

- ◆ Tightening torques ⇒ [page 178](#) .
- ◆ Observe tightening sequence of exhaust gas turbocharger to cylinder head ⇒ [page 181](#) .
- ◆ Gaskets, gasket rings and self-locking nuts must be replaced.
- ◆ Fill the exhaust turbocharger with engine oil at the connection fitting for the oil feed line.
- ◆ After installing the exhaust turbocharger, run engine at idling speed for about 1 minute to ensure that oil is supplied to the exhaust turbocharger.
- ◆ The coolant return-flow line must be installed together with the exhaust turbocharger.
- ◆ Hose connections and hoses for charge air system must be free of oil and grease before being assembled. The gasket ring and the sealing surface must be slightly oiled only for push-fit couplings ⇒ [page 196](#) .
- ◆ Secure all hose connections with hose clamps ⇒ Electronic Catalogue of Original Parts .
- Install pre-exhaust pipe ⇒ [page 237](#) .
- Top up coolant ⇒ [page 114](#) .



1.3 Checking proper operation of pressure box for exhaust gas turbocharger

Special tools and workshop equipment required

- ◆ Hand vacuum pump , e.g. -VAS 6213-

Test condition

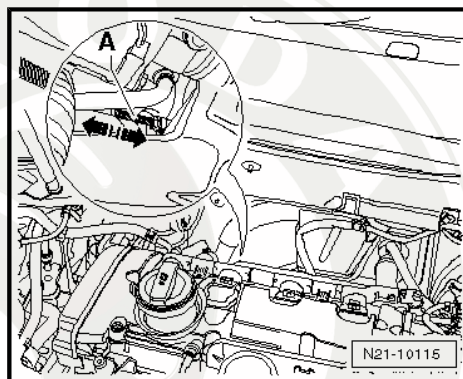
- Engine oil temperature at least 60 °C
- The hoses for the exhaust gas turbocharger to the charge pressure control solenoid valve -N75- and for the charge pressure control solenoid valve -N75- must have access to the pressure box.
- charge pressure control solenoid valve -N75- o.k.
- The exhaust gas system must be tight.

Work procedure

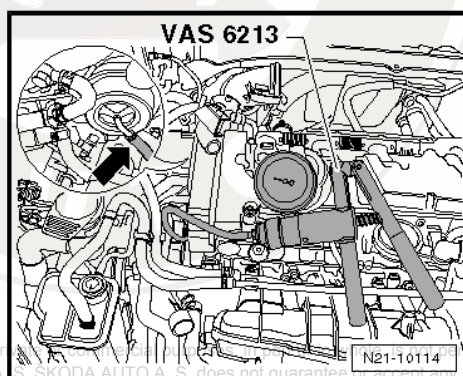
- Remove engine cover.

- Start the engine and observe the actuation linkage -A- of the pressure unit at the exhaust turbocharger with a mirror.
- Now bring the engine with a second mechanic up to high revolutions by spontaneously pressing on the accelerator pedal.
- Now the linkage -A- must move.

If the linkage does not move:



- Connect the hand vacuum pump -VAS 6213- to the pressure unit -arrow-.

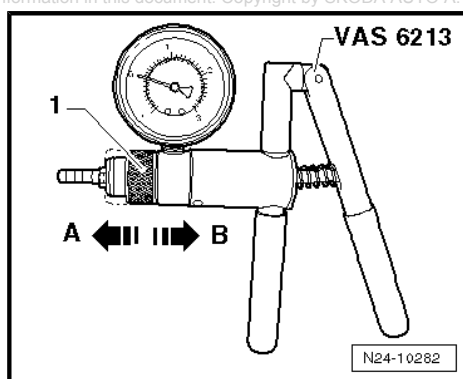


- Put sliding ring -1- of hand vacuum pump -VAS 6213- in position -B- for “pressure”.



Caution

The pressure must not be greater than 0,075 MPa (750 mbar). If the pressure is exceeded, the pressure box may be damaged.



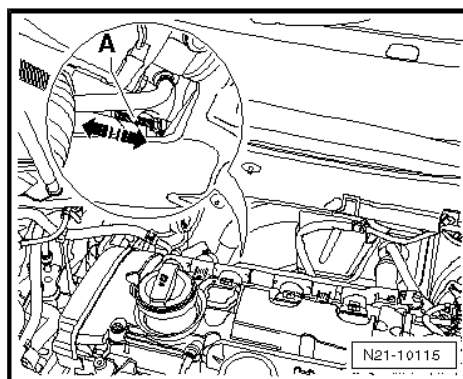
- Operate the hand vacuum pump -VAS 6213- several times and at the same time observe the linkage.
- The linkage -A- must move slowly as of approx. 0.030 mbar (300 mbar) and must be positioned at the end stop at approx. 0.070 MPa (700 mbar).

The stroke of the linkage is about 10 mm.



Note

- ♦ If no pressure is built up with the hand vacuum pump -VAS 6213- or the pressure drops immediately, check the hand vacuum pump -VAS 6213- and the connecting hoses for tightness.
- ♦ If no fault is found: Replace pressure box ➔ [page 189](#).
- ♦ If the pressure box is o.k. and the linkage -A- does not move: Check the bypass flap lever for smooth operation. If the lever is sluggish or blocked: Replace pressure unit ➔ [page 182](#).



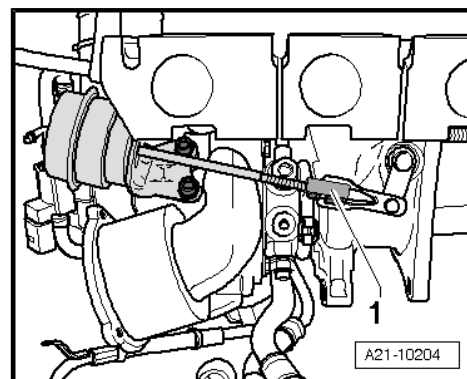
1.4 Removing and installing pressure box for exhaust turbocharger

Removing

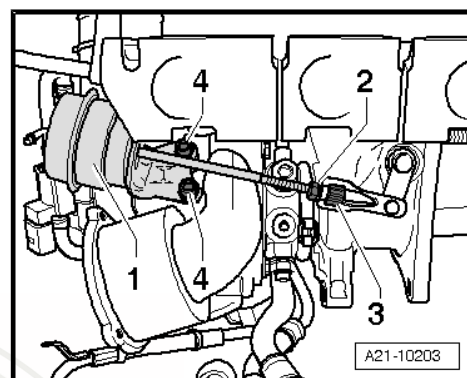
- Remove exhaust turbocharger ⇒ [page 182](#) .

For engines with identification characters BZB, CDAA, CDAB

- Remove lock washer -1- above the linkage of the pressure box at turbocharger.

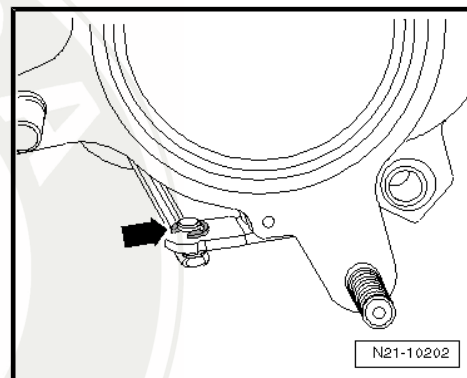


- Release counternut -2 -.
- Separate the linkage from the exhaust turbocharger -3-.
- Release screws -4- and remove the pressure box -1-.



For engines with identification characters CCZA

- Detach the lock washer from the linkage of the pressure box -arrow-.



- Release screws -4- and remove the pressure box -1-.

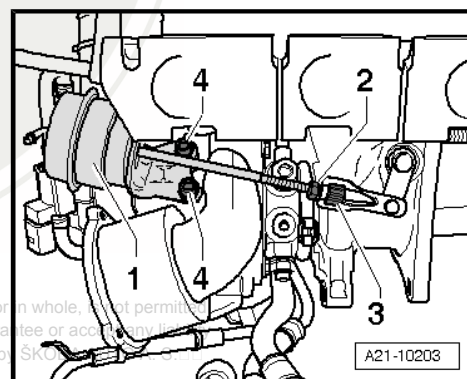
Installing

Installation is carried out in the reverse order. Pay attention to the following:

- ♦ Tightening torques: ⇒ [page 178](#) .

For engines with identification characters BZB, CDAA, CDAB

- Setting exhaust turbocharger pressure unit ⇒ [page 190](#) .



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1.5 Setting the pressure box for exhaust turbocharger (for engines with identification characters BZB, CDAA, CDAB)

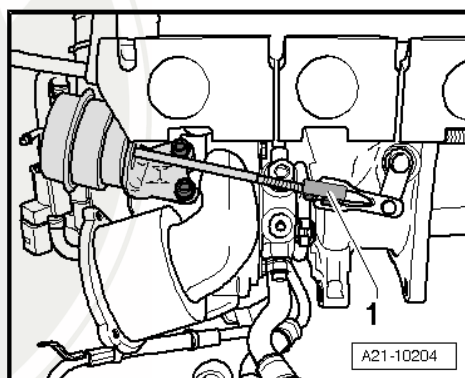
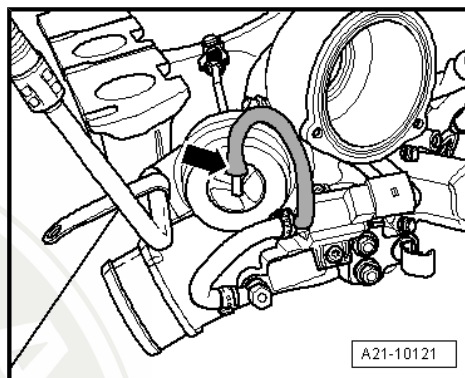
Special tools and workshop equipment required

- ◆ Universal dial gauge holder -MP 3-447 (VW 387)-
- ◆ Hand vacuum pump , e.g. -VAS 6213-
- ◆ Pressure control valve , e.g. -VAS 6342-
- ◆ Turbocharger tester , e.g. -V.A.G 1397 A-
- ◆ Dial gauge , e.g. -VAS 6341/1-
- ◆ 30 mm extension , e.g. -VAS 6341/3 -
- ◆ Flat button , e.g. -VAS 6341/4-

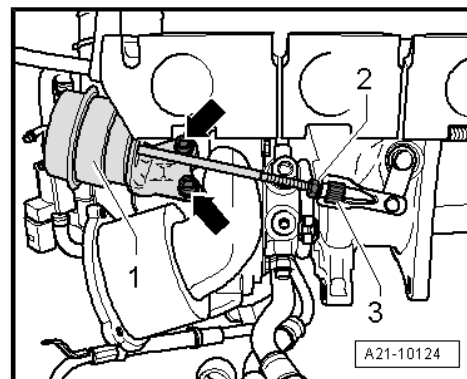


Note

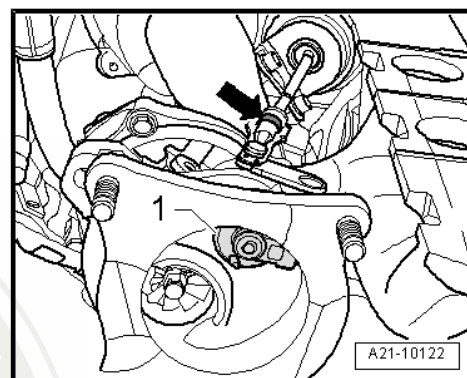
- ◆ *This work sequence is only intended to set the pressure box. When checking already set pressure boxes, the values may differ.*
- ◆ *The pressure unit must only be set if the linkage was detached.*
- ◆ *The setting is performed on a removed exhaust turbocharger.*
- Remove exhaust turbocharger ➔ [page 182](#) .
- Detach the hose -arrow- from the pressure unit at the exhaust turbocharger.
- Remove lock washer -1- above the linkage of the pressure box at turbocharger.



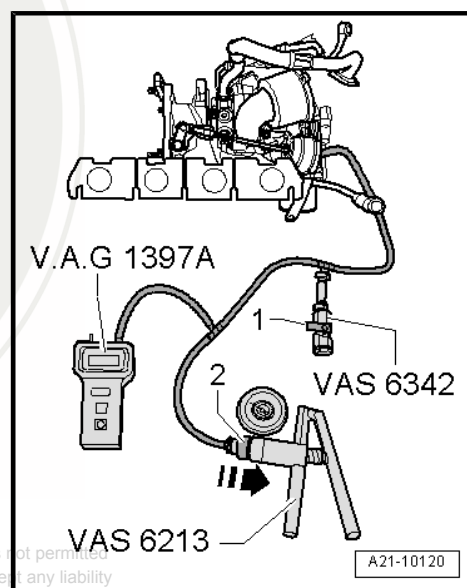
- Release counternut -2-.



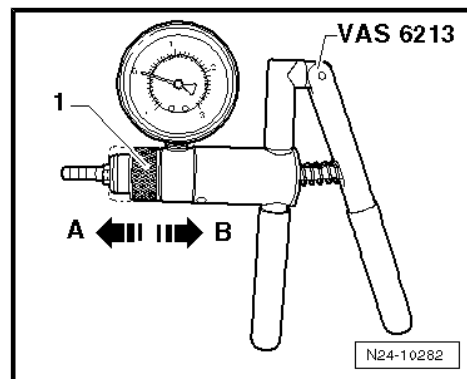
- Pre-set the bypass flap -1- above the linkage of the pressure unit -arrow- in such a way that the bypass flap can still be turned manually in its position.
- Tighten the counternut by hand.



- Fit together the hand vacuum pump -VAS 6213-, the turbo-charger tester -V.A.G 1397 A- with connection II and the pressure control valve -VAS 6342- as shown in the figure.
- Connect the pressure control valve -VAS 6342- at lever -1-.



- Put sliding ring -1- of hand vacuum pump -VAS 6213- in position -B- for "pressure".
- Switch on the turbocharger tester -V.A.G 1397A- and position the sliding switch to position II.



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- Attach universal dial gauge holder -MP 3-447- to exhaust turbocharger -arrow-.
- Attach the dial gauge -VAS 6341/1- with 30 mm extension -VAS 6341/3- and flat button -VAS 6341/4- at universal dial gauge holder -MP 3-447-.
- At 0°MPa (0°bar) set the dial gauge -VAS 6341/1- to 1 mm preload.
- Turn the readout of the dial gauge -VAS 6341/1- to 0 (zero).
- Test the smooth operation of the dial gauge.
- Operate the hand vacuum pump -VAS 6213- until the turbocharger tester -V.A.G 1397 A- displays 0.046 MPa $\pm$ 0.0005 MPa (460 mbar $\pm$ 5 mbar).
- The dial gauge must indicate 4.1...4.3 mm, otherwise turn the linkage of the pressure unit until the value is indicated.



Note

The mm details relate to the read off value (containing 1 mm preload).

- Tighten the counternut by hand.
- Repeat measurement.
- Release the pressure via the pressure control valve -VAS 6342- to 0 MPa (0 bar).
- Position dial gauge -VAS 6341/1- to 0 (zero).



Note

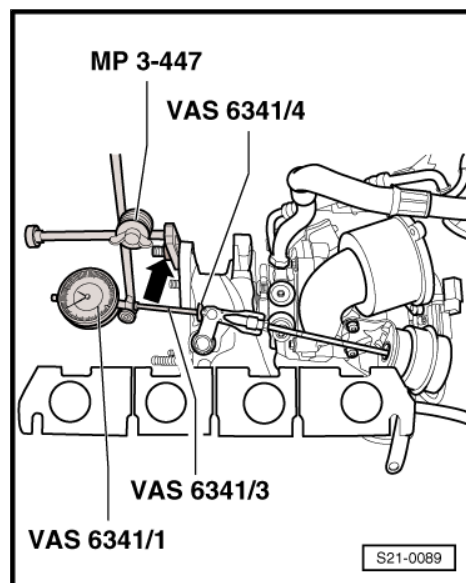
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- ♦ *Observe the sequence of the following measurements.*
- ♦ *In-between the pressure must not be released to 0 MPa (0 bar).*
- Operate the hand vacuum pump -VAS 6213- until the turbocharger tester -V.A.G 1397 A- displays 0.046 MPa $\pm$ 0.0005 MPa (460 mbar $\pm$ 5 mbar).
- Read off value on the dial gauge -VAS 6341/1- (value 1) and note.
- Operate the hand vacuum pump -VAS 6213- until the turbocharger tester -V.A.G 1397 A- displays 0.065 MPa to 0.070 MPa (650 mbar to 700 mbar).
- Release the pressure via the pressure control valve -VAS 6342- to 0.046 MPa $\pm$ 0.0005 MPa (460 mbar $\pm$ 5 mbar).
- Read off value on the dial gauge -VAS 6341/1- (value 2) and note.
- Add value 1 and 2 together and divide by 2.
- The result (mean value) must be 5 $\pm$ 0.25 mm.

If the result (mean value) is not 5 $\pm$ 0.25 mm:

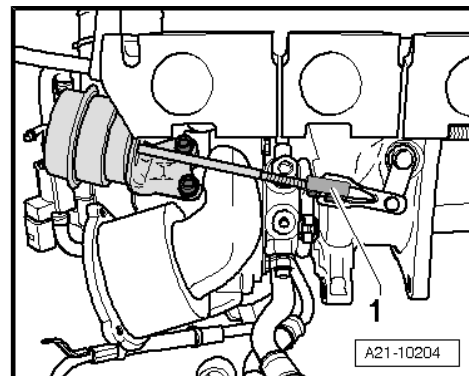
- Adjust the setting, tighten the counternut by hand and repeat measurement.

If the result (mean value) is 5 $\pm$ 0.25 mm:





- Tighten counternut to 9 Nm and secure with seal paint ⇒ electronic catalogue of original parts .
- Attach lock washer -1- above the linkage of the pressure box to turbocharger.



2 Charge air system with exhaust gas turbocharger

Observe the general notes for assembly work on the charge air system with exhaust gas turbocharger ➔ [page 7](#).

2.1 Charge air cooling - Summary of components

1 - 5 Nm

2 - Bearings

□ for charge air cooler

3 - Charge air cooler

□ with top and bottom seal fitted

□ removing and installing
➔ [page 194](#)

4 - Charge air pipe

5 - 10 Nm

6 - from exhaust turbocharger

7 - Charge air hose

8 - to throttle valve control unit
-J338-

9 - Charge air hose

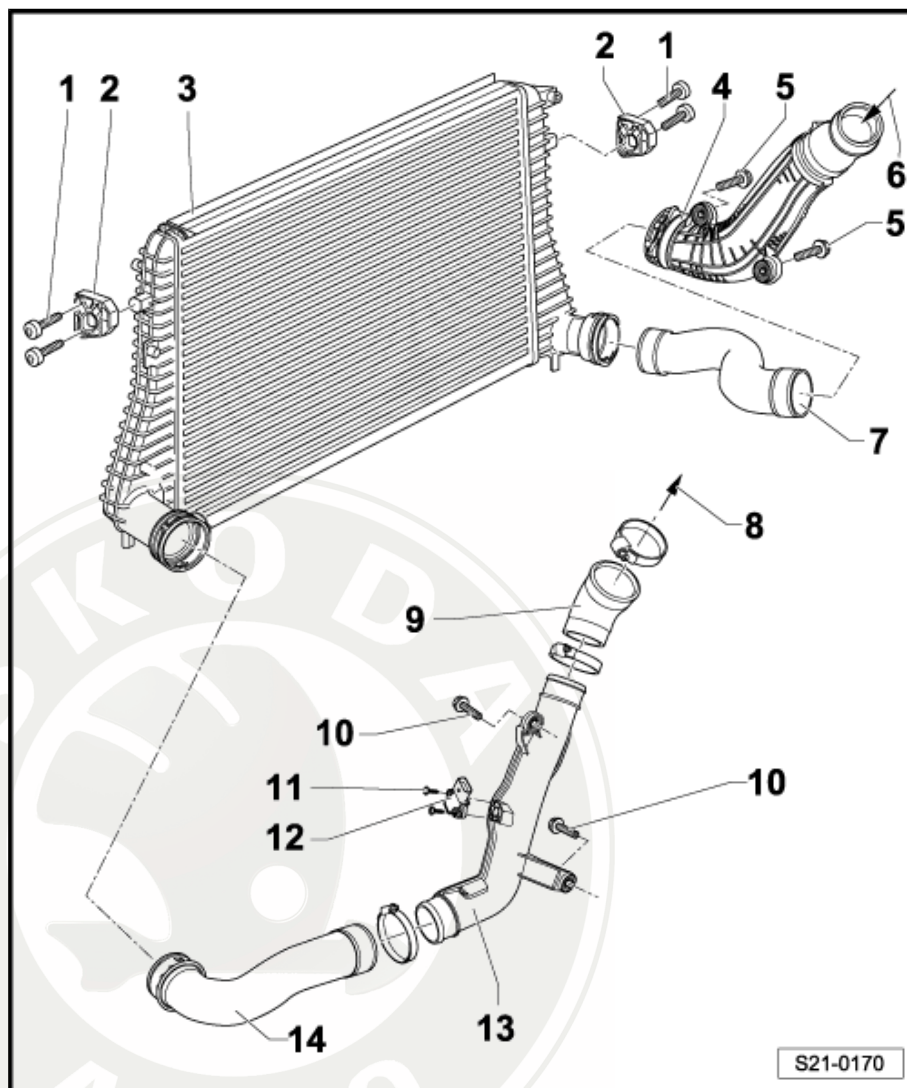
10 - 10 Nm

11 - 5 Nm

12 - Charge pressure sender -
G31-

13 - Charge air pipe

14 - Charge air hose



2.2 Removing and installing charge air cooler

Removing

- Remove radiator ➔ [page 136](#).
- Remove front bumper ➔ Body Work; Rep. Gr. 63.
- Remove the charge air hoses on the left and right from the charge air cooler.



WARNING

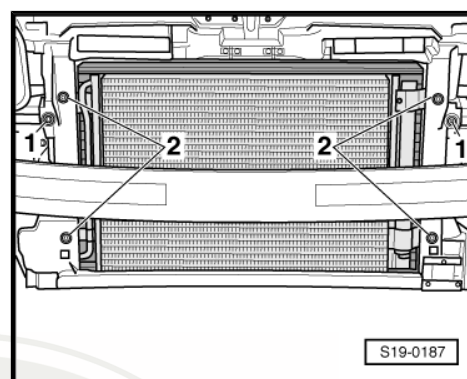
Do not open the refrigerant circuit of the air conditioning system.



Caution

In order to avoid damage to the condenser as well as to the refrigerant lines and hoses, ensure that the lines and hoses are not over-tensioned, kinked or bent.

- Screw out the fixing screws -2- of the condenser.
- Unscrew fixing screws -1- for charge air cooler on right and left
⇒ [page 194](#) .



- Press off the charge air cooler from the lock carrier with the assistance of a 2nd mechanic so that the screw -1- for attaching the pipes of the air conditioning system is accessible.
- Remove screw -1-.
- Carefully remove radiator downwards.

Install

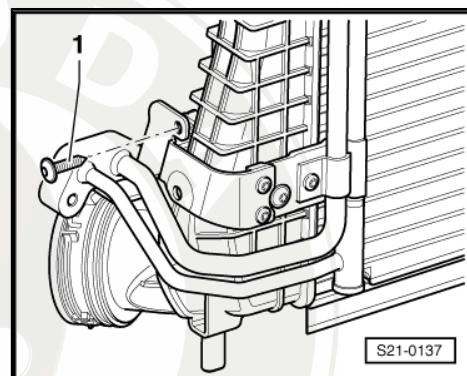
Installation is performed in the reverse order, pay attention to the following points:



Note

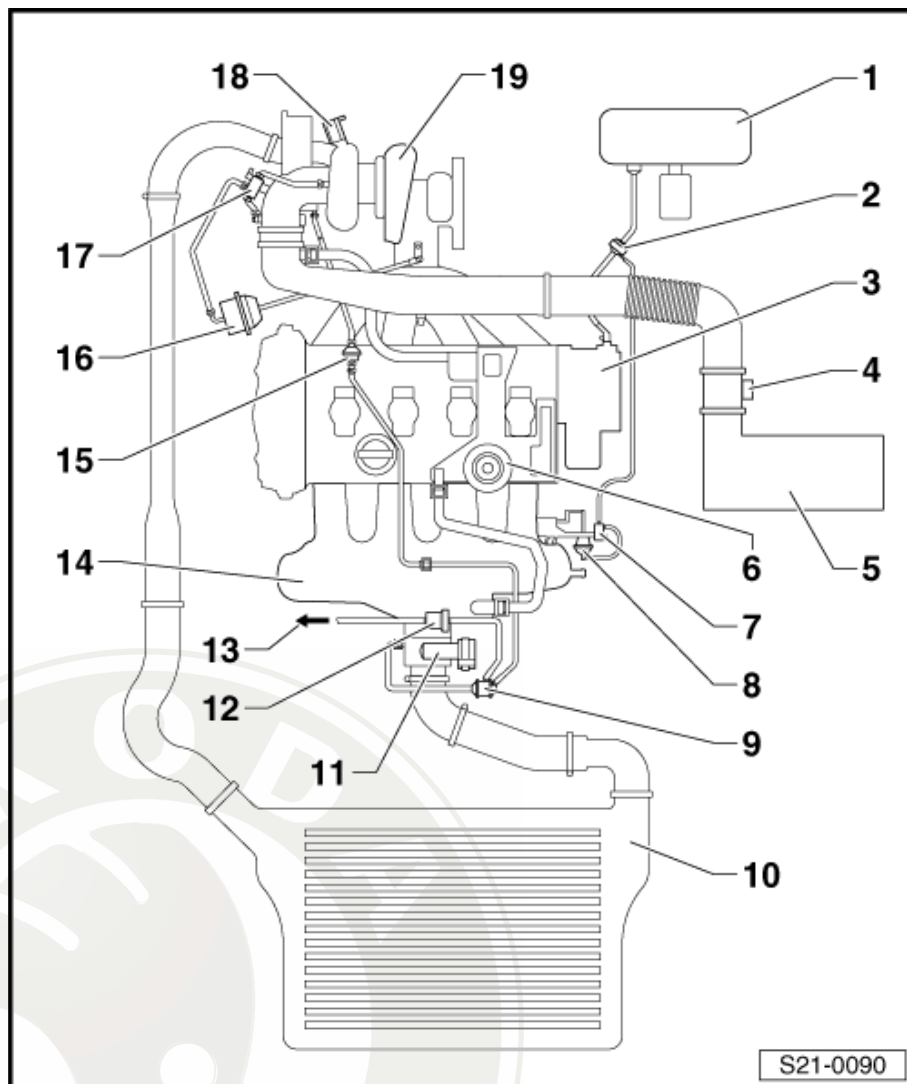
Replace O-rings.

- Observe the assembly instruction for hose connections with push-fit couplings ⇒ [page 196](#) .



2.3 Overview plan for the exhaust turbocharging

- 1 - Brake servo unit
- 2 - Non-return valve with connection fitting
- 3 - Vacuum pump
- 4 - Air mass meter -G70-
- 5 - Air filter
- 6 - Crankcase ventilation
 - ☐ with pressure control valve
- 7 - Valve for variable intake manifold changeover -N156-
- 8 - Setting element for the intake manifold flap valve
- 9 - Double non-return valve
 - ☐ check ➔ [page 228](#)
 - ☐ a component with activated charcoal filter solenoid valve 1 -N80-
- 10 - Charge air cooler
- 11 - Throttle valve control unit -J338-
- 12 - Solenoid valve 1 for activated charcoal filter -N80-
 - ☐ a component with double non-return valve
- 13 - to the activated charcoal filter system
- 14 - Intake manifold
- 15 - Non-return valve
- 16 - Charge pressure control pressure unit
- 17 - Solenoid valve for charge pressure control -N75 -
- 18 - Turbocharger divert air valve -N249-
- 19 - Exhaust gas turbocharger



2.4 Hose connections with push-fit couplings



Caution

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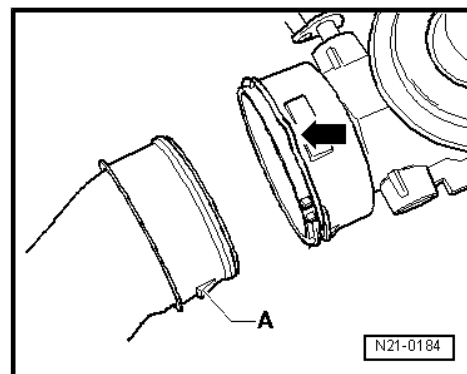
The gasket ring for the push-fit coupling can be damaged, if the locking clip is in the lock position during the assembly. This could result in a leakage. Observe the assembly instruction.

Removing

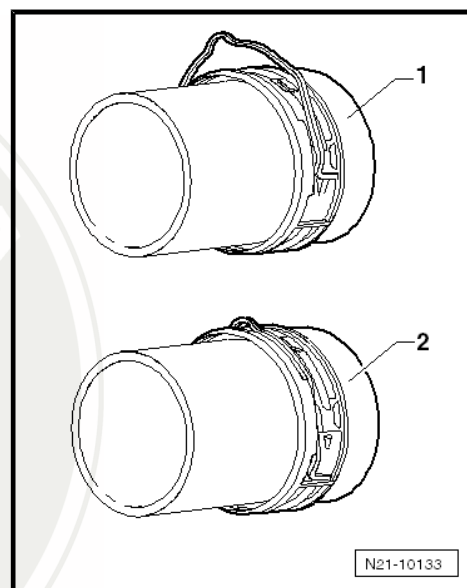
- Release push-fit coupling by pulling the locking clip -arrow-. Disconnect hose/pipe without auxiliary tool.

Install

- When replacing the gasket ring, place the gasket ring in the groove of the charge air hose. Make sure that the gasket ring is fully seated all around in the groove and not twisted.
- Oil the sealing surface and the gasket ring.



- Put the locking clip into the release position -1-.
- Insert the charge air hose up to the stop into the coupling.
- Put the locking clip into the lock position -2- and then press down once again the charge air hose.
- Check for correct seating and the correct locking in place of the push-fit coupling by pulling on the hose.



2.5 Check charge air system with exhaust turbocharger for tightness

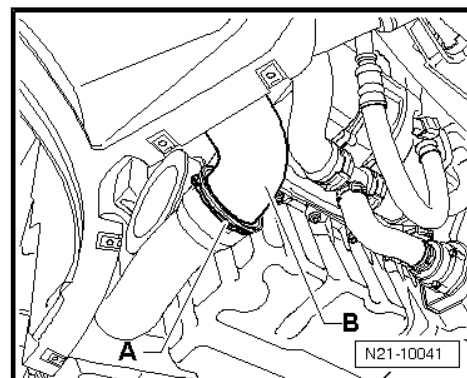
Special tools and workshop equipment required

- ◆ Charge-air system testing device , e. g. -V.A.G 1687-

- ◆ Adapter , e.g. -V.A.G 1687/5-

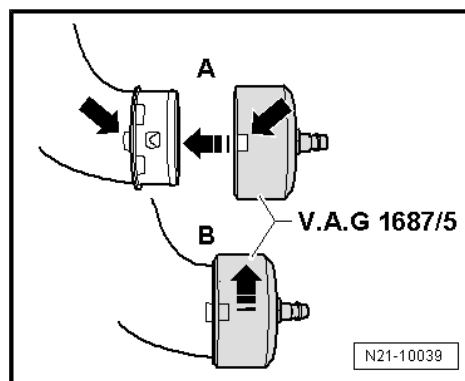
- ◆ Ultrasonic measuring device e. g. -V.A.G 1842-

- Remove the sound dampening system ⇒ Body Work ⇒ Rep. Gr. 50 .
- Release the clasp -A- and pull off the hose -B- from the charge air pipe.



- Mount the adapter -V.A.G 1687/5- onto the charge air hose -A- and turn it to approx. 90° -B-.

Prepare tester for charge air system -V.A.G 1687- as follows:

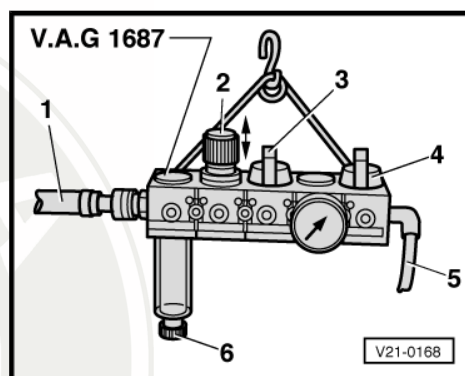


- Unscrew pressure control valve -2- fully and close the valves -3- and -4-.

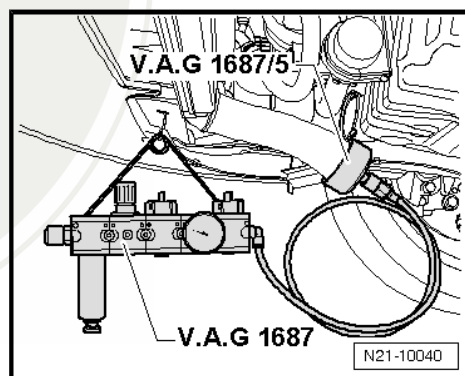


Note

The rotary knob must be pulled to the top in order to rotate the pressure control valve -2-.



- Connect tester for charge air system -V.A.G 1687- as shown:



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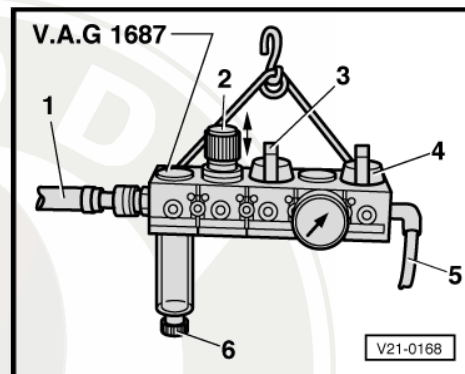
- Connect the pneumatic hose -1- (pneumatic support) at tester for charge air system -V.A.G 1687 - .



Note

If there is water in the inspection glass, drain water via the drain plug -6-.

- Open valve -3-.
- Set the pressure to 0.05 MPa (0.5 bar) with the pressure control valve -2-.



Caution

The pressure must not be greater than 0.05 MPa (0.5 bar)! A too high pressure can damage the engine.

- Open valve -4- and wait until the test circuit is filled. If necessary regulate the pressure to 0.05 MPa (0.5 bar).
- Listen to, touch or use commercially available leak search spray or the ultrasonic measuring device -V.A.G 1842- to check the charge-air system for leak points.



Note

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- ◆ *A small amount of air escapes via the valves into the engine. For this reason no pressure test is possible.*
- ◆ *Use of ultrasonic measuring device -V.A.G 1842- → operating instructions .*
- ◆ *Before removing the adapter, depressurize the test circuit by detaching the coupling from the adapter -V.A.G 1687/5- .*
- ◆ *Hose connections and hoses of the charge air system must be free of oil and grease before being installed.*

24 – Fuel Formation, Injection

1 Fitting location of the injection system

The components A to G are not shown on the explosion sign.

1 - Camshaft adjustment valve 1 -N205-

2 - Solenoid valve for charge pressure control -N75-

- ☐ screwed onto turbo-charger ➔ [page 178](#)

3 - Turbocharger divert air valve -N249-

- ☐ screwed onto turbo-charger ➔ [page 178](#)

4 - Ignition coils with a power output stage

- ☐ removing and installing ➔ [page 241](#)
- ☐ Ignition coil 1 with a power output stage - N70-
- ☐ Ignition coil 2 with a power output stage - N127-
- ☐ Ignition coil 3 with a power output stage - N291-
- ☐ Ignition coil 4 with a power output stage - N292-

5 - Engine control unit -J623 -

- ☐ removing and installing ➔ [page 230](#)

6 - Lambda probe -G39-

- ☐ Identification characters BZB: in the pre-exhaust pipe ➔ [page 232](#)
- ☐ Identification characters CDAA, CDAB, CCZA: in the pre-exhaust pipe ➔ [page 234](#)

7 - High pressure pump

- ☐ removing and installing ➔ [page 220](#)

8 - Control valve for fuel pressure -N276-

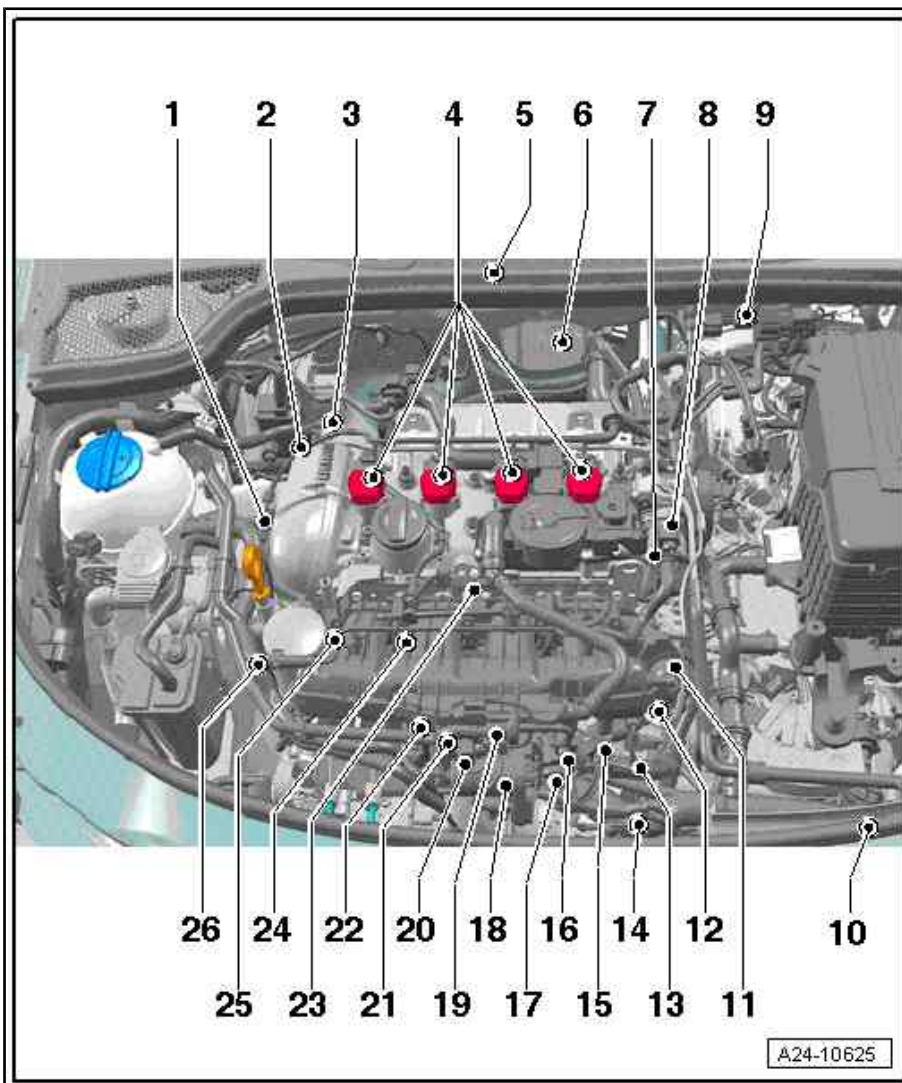
- ☐ Part of the high pressure pump

9 - Plug for lambda probe -G39-

- ☐ in the bracket on the partition wall
- ☐ only for engine identification characters CDAA, CDAB, CCZA

10 - Coolant temperature sender at radiator outlet -G83-

- ☐ in bottom radiator fitting ➔ [page 112](#)





11 - Setting element for the intake manifold flap valve

12 - Intake manifold flap valve -N316-

13 - Engine speed sender -G28 -

- ☐ in front cylinder block on the bottom left

14 - Charge pressure sender -G31-

- ☐ screwed onto charge-air pipe for throttle valve control unit -J338- ➔ [page 194](#)

15 - Plug connection of knock sensor 1 -G61-

- ☐ below the intake manifold

16 - Plug connection of Hall sender -G40-

- ☐ below the intake manifold

17 - 8-pin plug connection for injection valves

- ☐ below the intake manifold

18 - Throttle valve control unit -J338-

- ☐ with throttle valve drive for electronic power control -G186 - , angle sensor 1 for throttle valve drive for electronic power control -G187- and angle sensor 2 for throttle valve drive for electronic power control -G188-
- ☐ after replacing, the engine control unit must be adapted ➔ Vehicle diagnosis, testing and information system VAS 5051
- ☐ removing and installing ➔ [page 215](#)
- ☐ clean ➔ [page 216](#)

19 - Activated charcoal filter solenoid valve 1 -N80-

20 - Intake air temperature sender -G42-

- ☐ bolted to front intake manifold ➔ [page 203](#)

21 - Knock sensor 1 -G61-

- ☐ at front cylinder block below the intake manifold
- ☐ Tightening torque: 20 Nm

22 - Coolant temperature sender -G62-

- ☐ in housing of coolant pump ➔ [page 124](#)
- ☐ replace ➔ [page 125](#)

23 - Hall sender -G40-

- ☐ screwed onto the front cylinder head cover ➔ [page 69](#)

24 - Fuel pressure sender -G247 -

- ☐ in the fuel distributor ➔ [page 204](#)
- ☐ removing and installing ➔ [page 213](#)

25 - Potentiometer for intake manifold flap -G336-

- ☐ in the right intake manifold

26 - Oil pressure switch

- ☐ on engine with identification characters BZB: Oil pressure switch -F1- 0.12 - 0.16 MPa (1.2 - 1.6 bar) black
- ☐ on engine with identification characters CDAA, CDAB, CCZA: Oil pressure switch -F22- 0.215 - 0.295 MPa (2.15 - 2.95 bar) blue
- ☐ in the bracket for auxiliary units ➔ [page 106](#)
- ☐ check ➔ [page 107](#)

A - Oil pressure switch for reduced oil pressure -F378-

- ☐ only on engine with identification characters CDAA, CDAB, CCZA
- ☐ check ➔ [page 107](#)



B - Valve for oil pressure control -N428-

- ☐ only on engines with identification characters CDAA, CDAB, CCZA
- ☐ in upper part of oil pan ⇒ [page 98](#)

C - Air mass meter -G70- and intake air temperature sender 2 -G299-

- ☐ behind the air filter ⇒ [page 217](#)

D - lambda probe downstream of catalytic converter -G130-

- ☐ only on engines with identification characters CDAA, CDAB, CCZA
- ☐ in the exhaust pipe ⇒ [page 234](#)

E - Accelerator pedal position sender -G79- and accelerator pedal position sender 2 -G185-

- ☐ in the vehicle interior
- ☐ removing and installing ⇒ [page 173](#)

F - Radiator fan control unit -J293-

- ☐ integrated into the radiator fan -V7-

G - Injection valves

- ☐ Injection valve for cylinder 1 -N30-
- ☐ Injection valve for cylinder 2 -N31-
- ☐ Injection valve for cylinder 3 -N32-
- ☐ Injection valve for cylinder 4 -N33-
- ☐ in the fuel distributor ⇒ [page 204](#)
- ☐ removing and installing ⇒ [page 222](#)



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2 Intake manifold and fuel distributor

2.1 Intake manifold - Summary of components

1 - 5 Nm

2 - Intake air temperature sender -G42-

3 - Solenoid valve 1 for activated charcoal filter -N80-

- ☐ a component with double non-return valve

4 - Intake manifold

- ☐ removing and installing ⇒ [page 205](#)

5 - Setting element for the intake manifold flap valve

- ☐ check ⇒ [page 227](#)

6 - 10 Nm

- ☐ replace

7 - Connection fitting for fuel feed line

8 - Fuel pressure regulating valve -N276-

9 - High pressure pump

- ☐ with fuel pressure regulating valve -N276 -
- ☐ removing and installing ⇒ [page 220](#)

10 - Roller tappet

- ☐ can remain stuck in the vacuum pump after removing the high pressure pump, removable

11 - Connection fitting for fuel high pressure line

- ☐ replace
- ☐ 22 Nm

12 - Fuel high pressure line

- ☐ do not install under tension
- ☐ 18 Nm

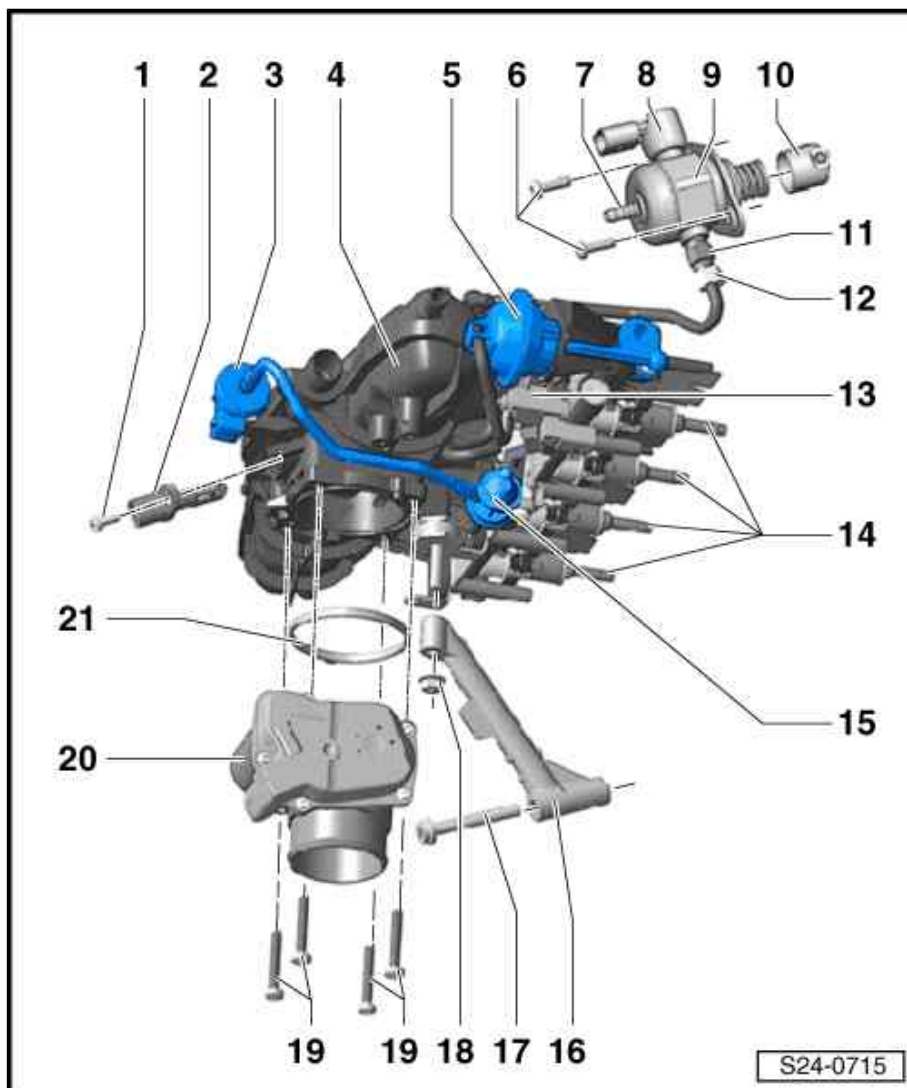
13 - Intake manifold flap valve -N316-

14 - Injection valves

- ☐ Replace O-ring and combustion chamber gasket ring (Teflon gasket ring)
- ☐ pay attention to correct installation position
- ☐ removing and installing ⇒ [page 222](#)

15 - Double non-return valve

- ☐ Attachment on intake manifold ⇒ [page 176](#)
- ☐ check ⇒ [page 228](#)
- ☐ one component with activated charcoal filter solenoid valve 1 -N80- ⇒ [page 176](#)



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16 - Intake manifold support

17 - 23 Nm

18 - 10 Nm

19 - 5 Nm

20 - Throttle valve control unit -J338-

- ☐ with throttle valve drive for electronic power control -G186 - , angle sensor 1 for throttle valve drive for electronic power control -G187- and angle sensor 2 for throttle valve drive for electronic power control -G188-
- ☐ in case of replacement, erase initialisation values and adapt the engine control unit to the throttle valve control unit → Vehicle diagnosis, testing and information system VAS 5051
- ☐ removing and installing ⇒ [page 215](#)
- ☐ clean ⇒ [page 216](#)

21 - Sealing ring

- ☐ replace
- ☐ the peg of the gasket ring must be in the corresponding groove of the intake manifold

2.2 Fuel distributor - Summary of component

1 - Injector

- ☐ Replace O-ring and combustion chamber gasket ring (Teflon gas-gasket ring)
- ☐ pay attention to correct installation position
- ☐ removing and installing ⇒ [page 222](#)

2 - Supporting ring

3 - Fuel distributor

- ☐ removing and installing ⇒ [page 205](#)

4 - High pressure pump

- ☐ with fuel pressure regulating valve -N276 -
- ☐ Fuel high pressure line to high pressure pump: 17 Nm
- ☐ Install fuel high pressure line not under tension
- ☐ removing and installing ⇒ [page 220](#)

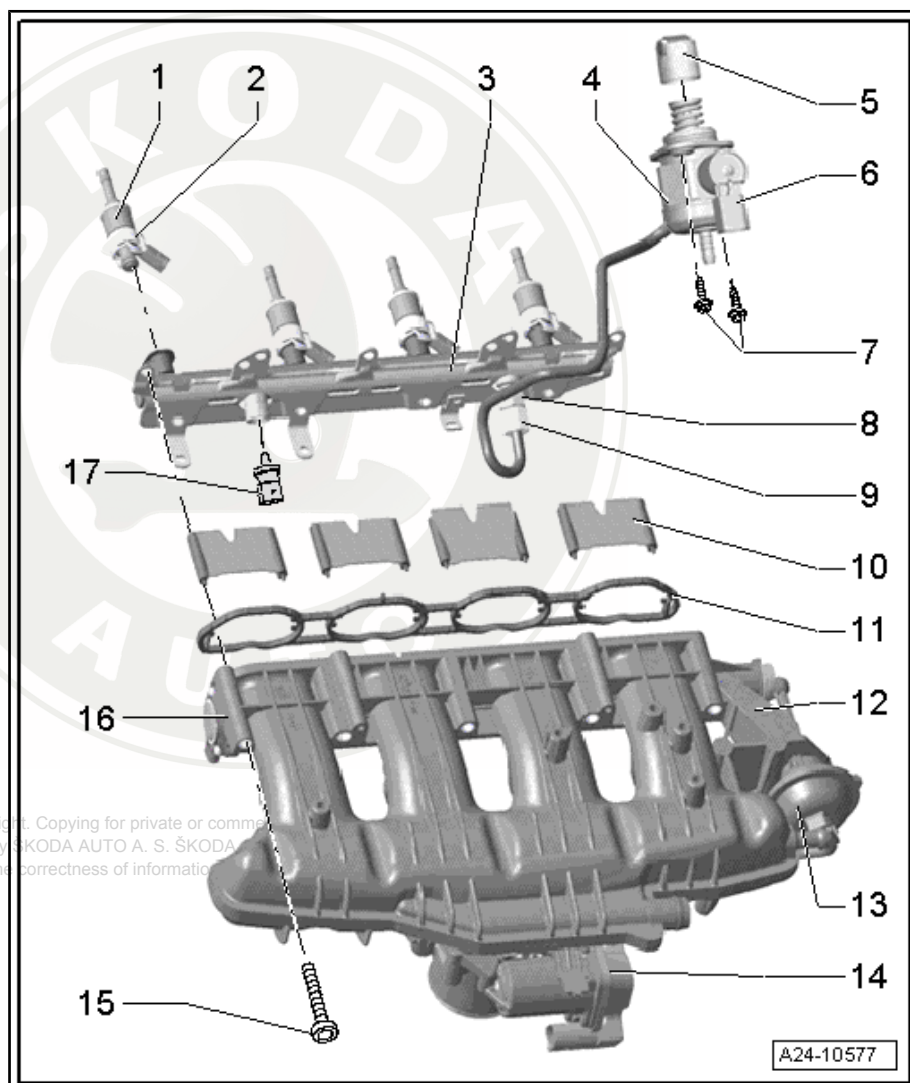
5 - Roller tappet

- ☐ can remain stuck in the vacuum pump after removing the high pressure pump, removable

6 - Fuel pressure regulating valve -N276-

7 - 10 Nm

- ☐ replace





8 - Connection fitting for fuel feed line

- ☐ replace
- ☐ 25 Nm

9 - Union nut of the fuel feed line

- ☐ 18 Nm

10 - Separation plate

11 - Gasket

- ☐ replace

12 - Intake manifold

- ☐ removing and installing ⇒ [page 205](#)

13 - Setting element for the intake manifold flap valve

14 - Throttle valve control unit -J338-

- ☐ with throttle valve drive for electronic power control -G186 - , angle sensor 1 for throttle valve drive for electronic power control -G187- and angle sensor 2 for throttle valve drive for electronic power control -G188-
- ☐ in case of replacement, erase initialisation values and adapt the engine control unit to the throttle valve control unit ⇒ Vehicle diagnosis, testing and information system VAS 5051

15 - Screws for the intake manifold

- ☐ first of all pre-tighten all of them to 3 Nm and then tighten to 9 Nm

16 - Potentiometer for intake manifold flap -G336-

- ☐ when replacing, adapt engine control unit to potentiometer for intake manifold flap ⇒ Vehicle diagnosis, testing and information system VAS 5051

17 - Fuel pressure sender -G247-

- ☐ 25 Nm
- ☐ Moisten thread with clean engine oil
- ☐ check ⇒ [page 211](#)
- ☐ removing and installing ⇒ [page 216](#)

2.3 Removing and installing intake manifold with fuel distributor

Special tools and workshop equipment required

- ◆ Oil filter wrench -3417 -
- ◆ Socket insert -T10347-



Note

- ◆ *If the intake manifold is replaced, the intake manifold flap potentiometer -G336- must be adapted ⇒ Vehicle diagnosis, testing and information system VAS 5051 to the engine control unit -J623 - .*
- ◆ *In order to reach the injection valves, the intake manifold with fuel distributor must be removed.*
- ◆ *The combustion chamber gasket ring (Teflon gasket ring) and O-ring must be replaced.*

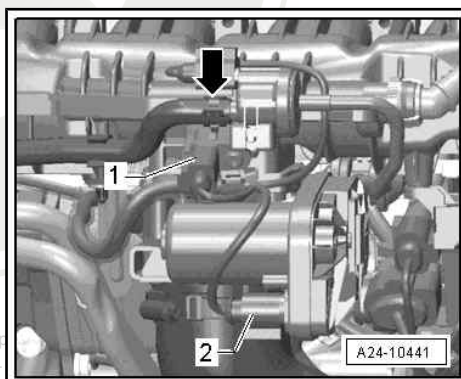
Removing



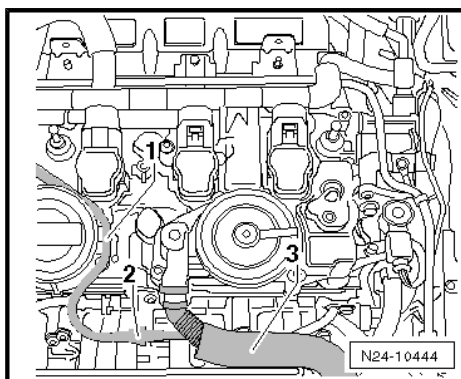
WARNING

The fuel system is under pressure! Before opening the high pressure of the injection system, the fuel pressure with a remaining pressure must be reduced ➔ [page 4](#).

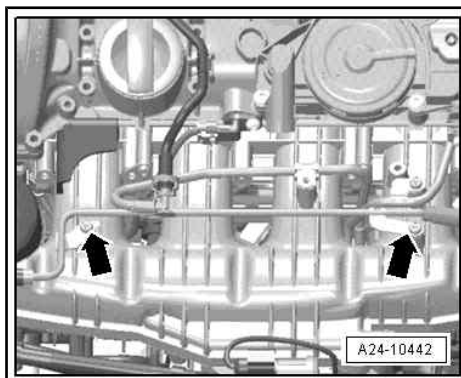
- Observe all safety measures and notes for assembly work on the fuel, injection and ignition system as well as the rules for cleanliness ➔ [page 3](#).
- Remove the air filter housing ➔ [page 218](#).
- Clean the contact face from the intake manifold to the cylinder head.
- Disconnect the vacuum line -arrow- to the activated charcoal filter system.
- Unplug the connector from the following components:
 - ◆ Intake air temperature sender -G42- -1-
 - ◆ Throttle valve control unit -J338- -2-
 - ◆ Solenoid valve 1 for activated charcoal filter -N80-
 - ◆ Hall sender -G40-



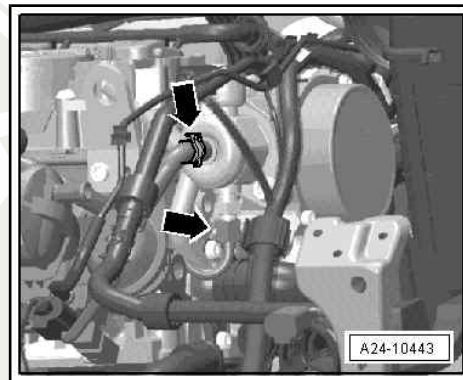
- Disconnect the vacuum line -1- at the separation point -2- and remove the hose for crankcase ventilation -3-.



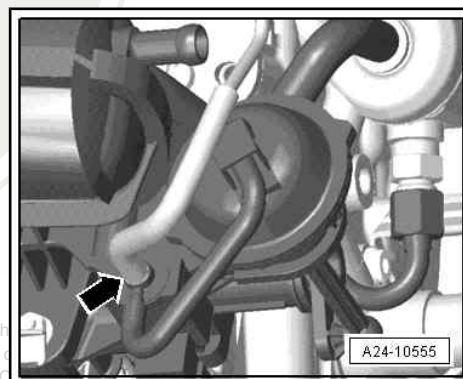
- Unscrew screws -arrows- of the fuel feed line and place the line to the side.



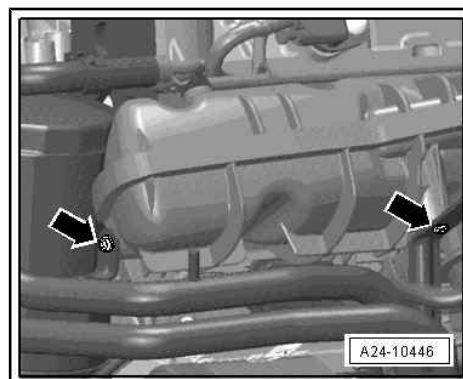
- Unscrew the union nut of the fuel line -lower arrow- to the high pressure pump.



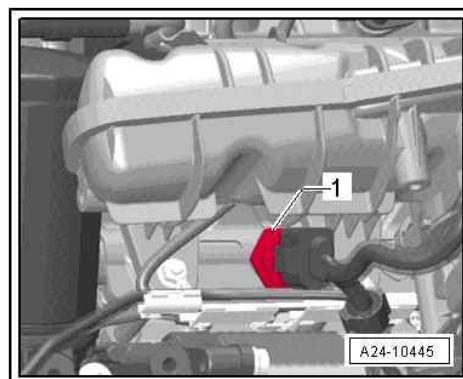
- Disconnect the vacuum line -arrow- from the intake manifold flap valve -N316- .



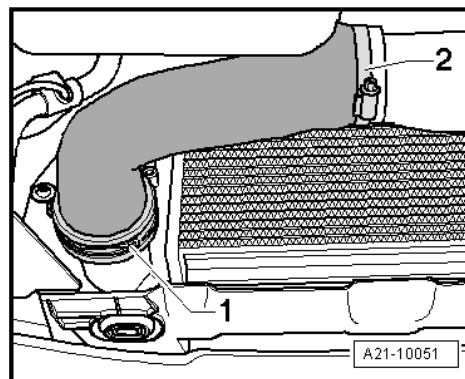
- Unscrew the screws -arrows- of the coolant line at intake manifold.



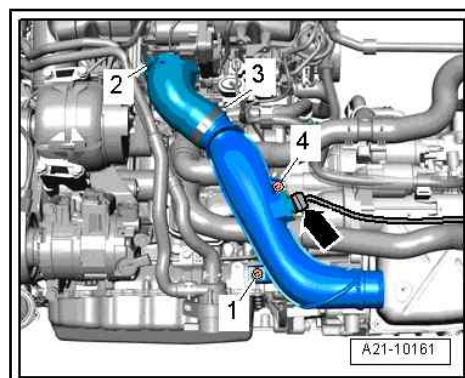
- Disconnect plug from fuel pressure sender -G247- -1-.
- Remove the sound dampening system ⇒ Body Work; Rep. Gr. 50 .



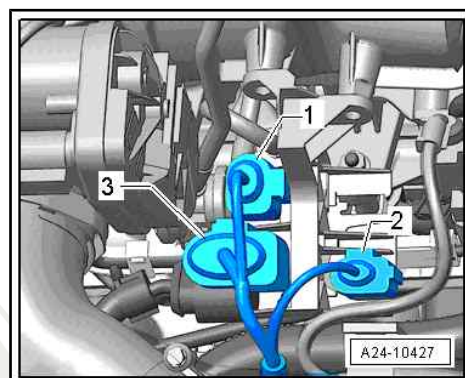
- Slacken clamps -1 and 2- and remove charge air hose.



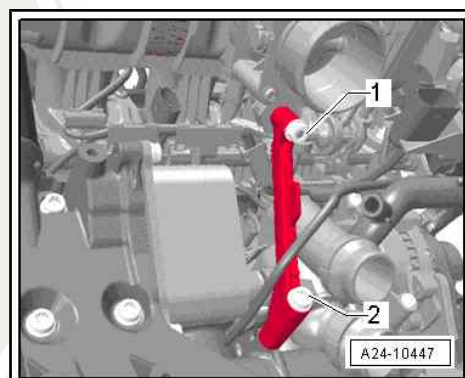
- Loosen clamp -2-.
- Disconnect plug -arrow- from charge pressure sender -G31- .
- Loosen clamp at charge air pipe.
- Unscrew screws -1- and -4- and remove the charge air pipe with the hose to the bottom.



- Disconnect the plug connections -1...3- and unscrew the bracket from the intake manifold.

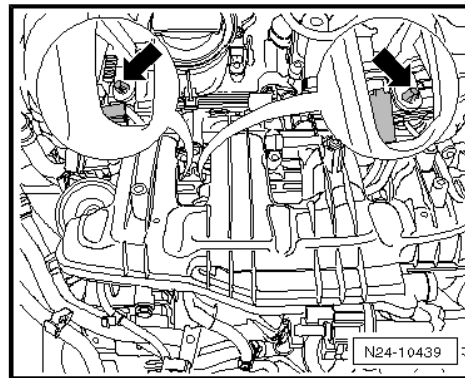


- Release nut -1-, release screw -2- and remove intake manifold support.
- Unscrew the oil filter using the oil filter wrench -3417- .
- Cover oil filter holder.

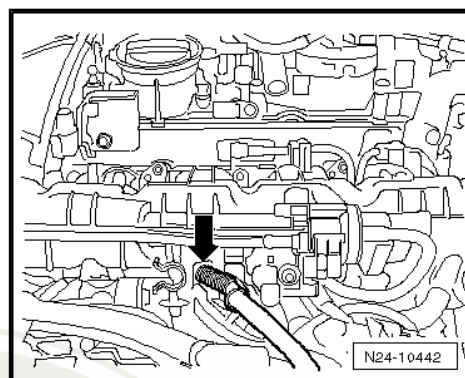




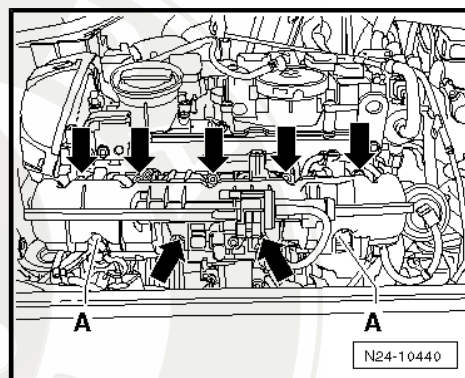
- Release the cable clip -arrows-.



- Release the cable -arrow- from the intake manifold.



- Unscrew nuts -A-.
- Release screws -arrows- with socket insert -T10347- .
- Carefully pull off the intake manifold with fuel distributor a little from the cylinder head.



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- Unplug plug -arrow- from potentiometer for intake manifold flap -G336- and remove the intake manifold.
- Seal intake passages with a clean cloth.



Note

The injection valves can remain stuck in the fuel distributor.

- Disconnect fuel distributor from intake manifold ⇒ [page 210](#) .

Install

- The injection valves are seated in the cylinder head. Install injection valves ⇒ [page 222](#) .
- Push the intake manifold over the pin screws (left and right) onto the cylinder head.



Note

Pay attention to correct fitting position of the injection valves and when positioning the intake manifold on the cable clip (below the intake manifold).

When installing the intake manifold, the intake manifold must again be slightly pulled off the cylinder head and if the injection valves remain stuck in the fuel distributor during this operation:

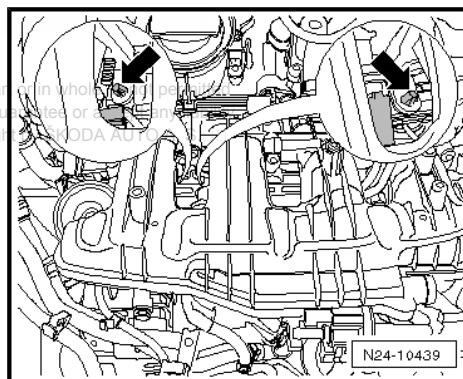
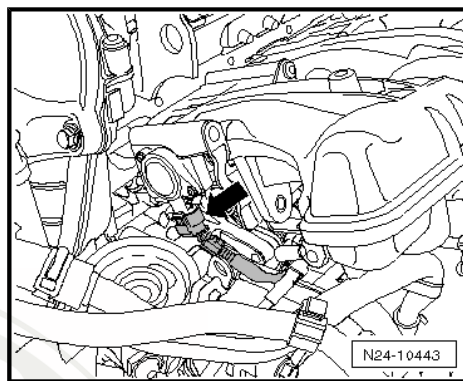
- Pull out the injection valves once again from the fuel distributor and reinsert them into the cylinder head.

Further installation occurs in reverse order. Pay attention to the following:

- Clip in all catches when locking the cable clip onto the intake manifold.

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- ♦ Summary of components of intake manifold: ⇒ [page 203](#)
- ♦ Summary of components of fuel distributor: ⇒ [page 204](#)



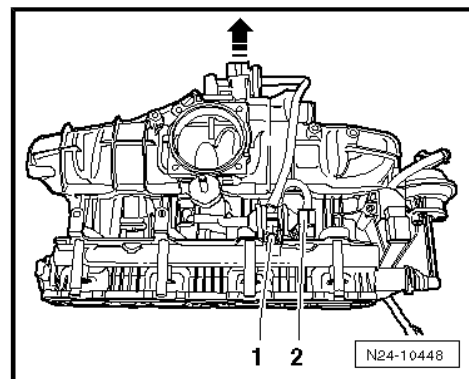
2.3.1 Disconnect fuel distributor from intake manifold



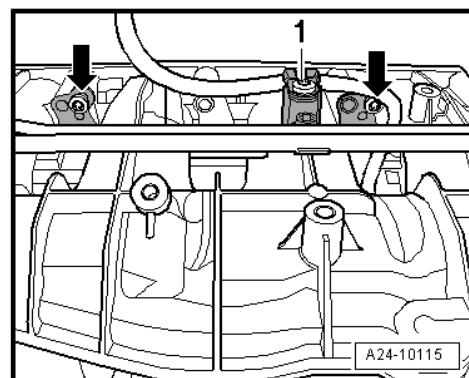
Note

The intake manifold must be removed, remove the intake manifold ⇒ [page 205](#) .

- Remove the activated charcoal filter system solenoid valve 1 -N80- -arrow- from the bracket.
- Remove the double non-return valve -1- and the fuel line -2-.



- Open hose clamp -1-.
- Unscrew both bottom screws -arrows-.
- Detach the fuel distributor from the intake manifold.

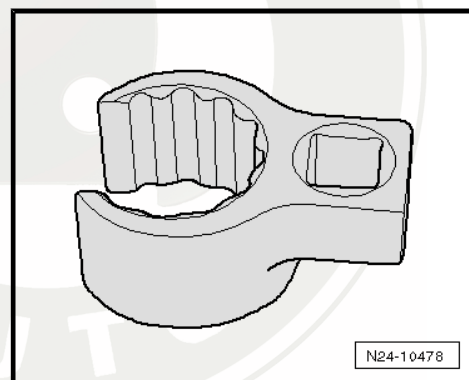


2.4 Check fuel pressure sender -G247 -

If the fuel pressure sender -G247- fails, the fuel pressure regulating valve -N276- is deactivated, the electric fuel pump is fully actuated and the pressure in the fuel distributor is adapted to the pressure in the fuel low pressure area. This results in poor mixture formation, torque reduction and irregular engine running.

Special tools and workshop equipment required

- ◆ Assembly tool -T10118-
- ◆ Socket wrench insert with square 3/8", 27 mm



- ◆ Pressure sensor tester , e.g. -VAS 6394- (includes digital manometer -VAS 6394/1-)
- ◆ Adapter , e.g. -VAS 6394/2-
- ◆ Test adapter , e.g. -VAS 5570-
- ◆ Vehicle diagnosis, measurement and information system - VAS 5051-

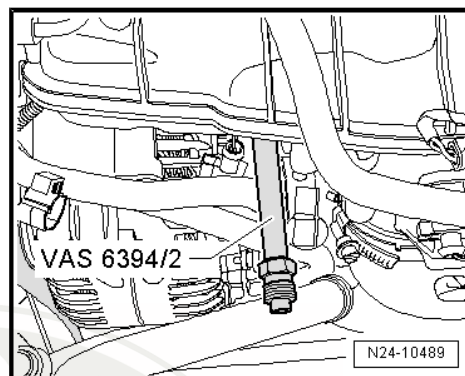
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Mounting sequence:

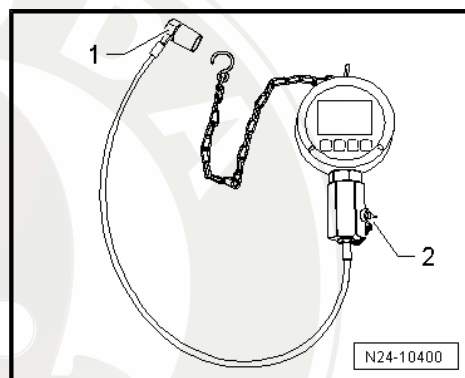
- Remove engine cover.

- Remove fuel pressure sender -G247- ➔ [page 213](#) .
- Screw in the adapter -VAS 6294/2- instead of the fuel pressure sender -G247- and screw it tight to the torque of the fuel pressure sender -G247 - .

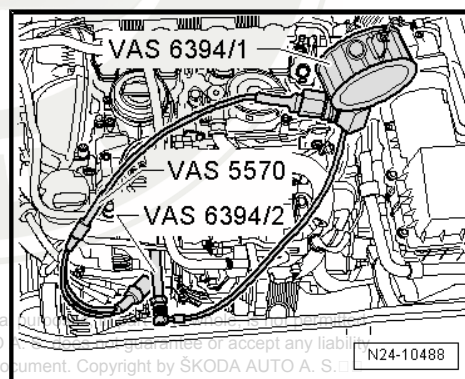
Tightening torque: ➔ [page 204](#)



- Open the screw plug -2- of the digital manometer -VAS 6394/1- and on this position tighten the removed fuel pressure sender -G247 - to its tightening torque.



- Use the test adapter -VAS 5570- in order to establish an electrical connection between the vehicle and the fuel pressure sender -G247- .



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- Connect the vehicle diagnosis, measurement and information system -VAS 5051- -1- as follows:
- Fit the plug -2- of the diagnostic cable on the diagnostic connection in the driver's footwell.
- Switch on ignition.
- On the display press consecutively the following buttons:

Vehicle self-diagnosis

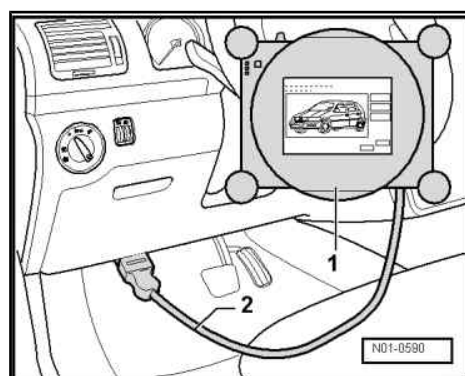
Self-diagnosis

@1 - Engine Electronics

@11 - Measured values

- Enter here 140 and confirm with [Q].

The actual value which is transmitted to the vehicle by the fuel pressure sender -G247- is shown in the display field 3.



- Switch on the digital manometer -VAS 6394/1- . For this step, briefly press the button -A- once.

Note

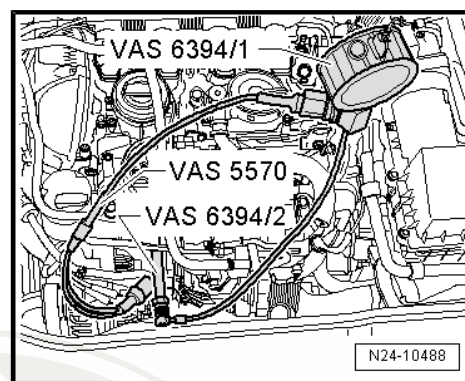
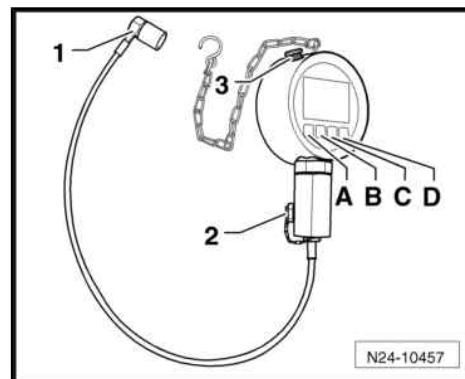
If the button -A- is pressed for 2 seconds, the illumination is switched on for 20 seconds.

- The digital manometer -VAS 6394/1- must indicate 0 MPa (0 bar).

If this is not the case:

- Briefly press the button -C- once for the zero point of the balance.
- Connect the pressure line of the digital manometer -VAS 6394/1- to the adapter -VAS 6394/2- .
- Start engine.
- Compare the displayed pressure on the digital manometer -VAS 6394/1- with the actual value on the vehicle diagnosis, measurement and information system -VAS 5051 - .
- The pressures may range up to max. 0.5 MPa (5 bar).

If the pressures do not correspond, the fuel pressure sender -G247- must be replaced.



WARNING

The digital manometer -VAS 6394/1- is under high fuel pressure! Disconnect the plug of the fuel pressure regulating valve -N276 - while the engine is running. Thereby the fuel pressure is reduced to approx. 0.6 MPa (6 bar). Switch off ignition. Place a cleaning cloth around the fuel pressure sender -G247- , then reduce the remaining pressure by carefully loosening the fuel pressure sender -G247- .

- Repeat the test with the new fuel pressure sender -G247- and once again compare both measured values.

If the measured values do not correspond again:

- Perform a cable testing ⇒ Vehicle diagnosis, testing and information system VAS 5051.

If the measured values correspond:

- Fuel pump relay -G247- OK

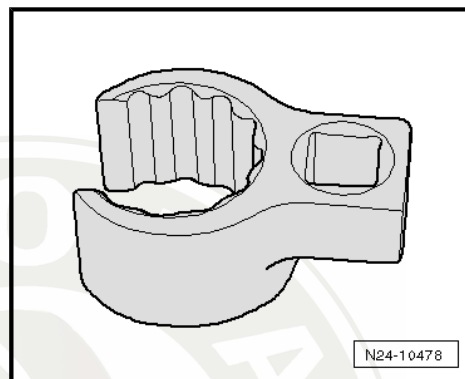
2.5 Removing and installing fuel pressure sender -G247-

Special tools and workshop equipment required

- ◆ Assembly tool -T10118-

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- ◆ Socket wrench insert with square 3/8", 27 mm



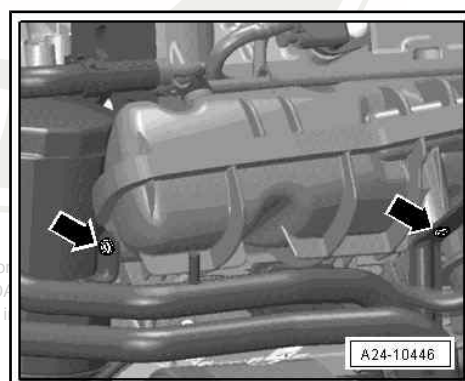
Removing



WARNING

The fuel system is under pressure! Before opening the high pressure of the injection system, the fuel pressure with a remaining pressure must be reduced ➔ [page 4](#).

- Unscrew coolant pipe -arrows- from intake manifold.



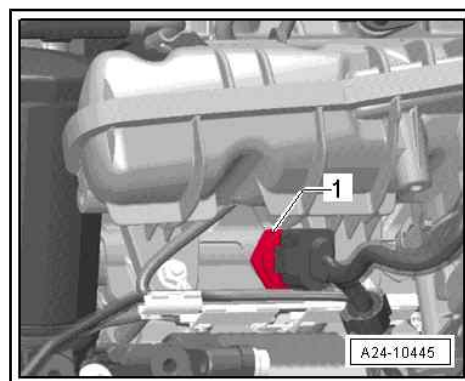
Protected by copyright. Copying for private or commercial use without permission is prohibited unless authorised by ŠKODA AUTO A. S. ŠKODA AUTO A. S. reserves the right to change the information with respect to the correctness of information.

- Release the connector from fuel pressure sender -G247- -1- with the assembly tool -T10118 - .
- Unscrew the fuel pressure sender -G247- .
- Collect escaping fuel with a cloth.

Install

Installation is carried out in the reverse order. Pay attention to the following:

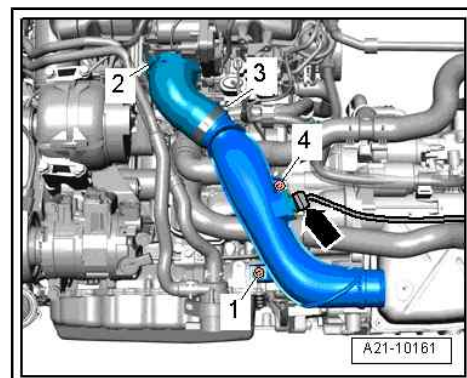
- ◆ Tightening torques: ➔ [page 204](#)



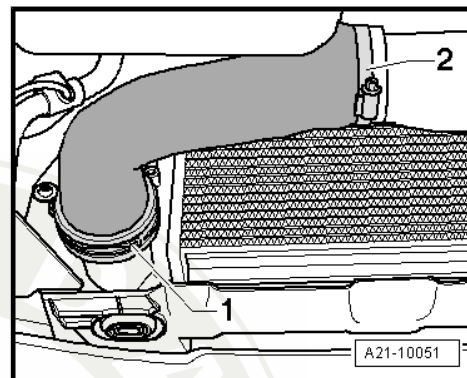
2.6 Removing and installing the throttle valve control unit -J338 -

Removing

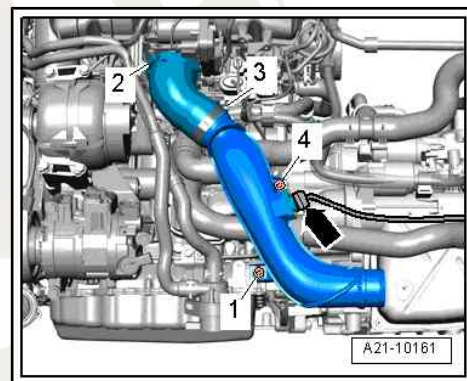
- Loosen hose clamp -2-.
- Screw out screw -4-.
- Disconnect plug connection -arrow-.
- Remove the sound dampening system ⇒ Body Work; Rep. Gr. 50 .



- Slacken clamps -1 and 2- and remove charge air hose.



- Screw out screw -1- and remove charge-air pipe downwards.



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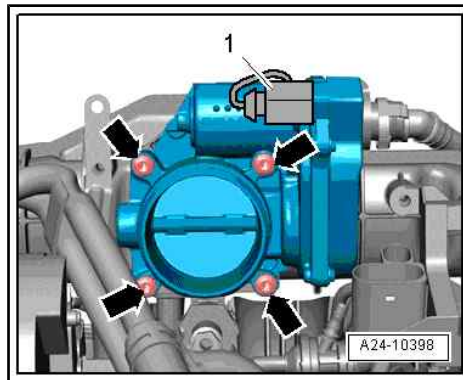


- Disconnect the plug -1- at the throttle valve control unit -J338-
- Release screws -arrows- and remove throttle valve control unit -J338-.

Install

Installation is carried out in the reverse order. Pay attention to the following:

- ♦ Tightening torques: ➔ [page 203](#)
- Clean sealing surface for gasket ring.
- Replace gasket ring.
- If a new throttle valve control unit - J338 - was installed, adapt the engine control unit to the throttle valve control unit -J338- ➔ Vehicle diagnosis, testing and information system VAS 5051.



2.7 Clean throttle valve control unit -J338-

Special tools and workshop equipment required

- ♦ Acetone



Note

- ♦ Observe the rules for cleanliness ➔ [page 5](#).
- ♦ The throttle valve support must not be scratched when cleaning.

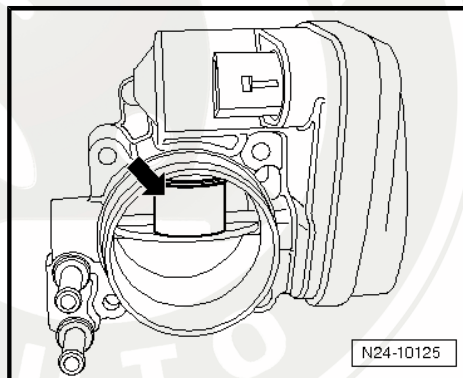
Work procedure

- Remove the throttle valve control unit ➔ [page 215](#).
- Open the throttle valve manually and block it in the opened position with a suitable object -arrow-.

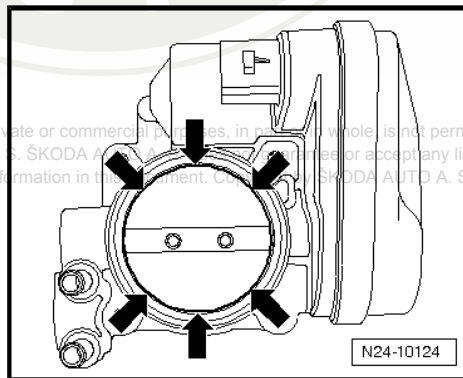


WARNING

Acetone is easily inflammable. Observe the accident prevention regulations and the safety instructions when handling easily inflammable fluids. Do not use compressed air when cleaning the throttle valve. Wear safety goggles and safety clothing, in order to avoid injuries and skin contact with fuel.



- Thoroughly clean the throttle valve support, in particular the area of the closed throttle valve -arrows-, with commercially available acetone and a paint brush.
- Wipe the throttle valve support with a fluffy cloth.
- Let the acetone dry off completely and re-install the cleaned throttle valve control unit.



3 Air filter

3.1 Air filter - Summary of components

Removing and installing air filter housing ➔ [page 218](#) .

1 - Spring strap clamp

2 - Air intake hose

- ☐ to exhaust gas turbo-charger

3 - Air mass meter -G70- and intake air temperature sender 2 -G299-



Note

4 - 2 Nm

- ☐ Captive screws for upper part of air filter housing

5 - 2 Nm

- ☐ Captive screws for upper part of air filter housing

6 - Upper part of air filter housing

7 - Filter element

8 - 8 Nm

- ☐ Captive screw for lower part of air filter housing

9 - Snow strainer

- ☐ not fitted to all vehicles

10 - Bottom part of the air filter housing

- ☐ clean the bottom part of air filter housing from salt residues, dirt and leaves

11 - Connection for water drain hose

- ☐ clean the connection

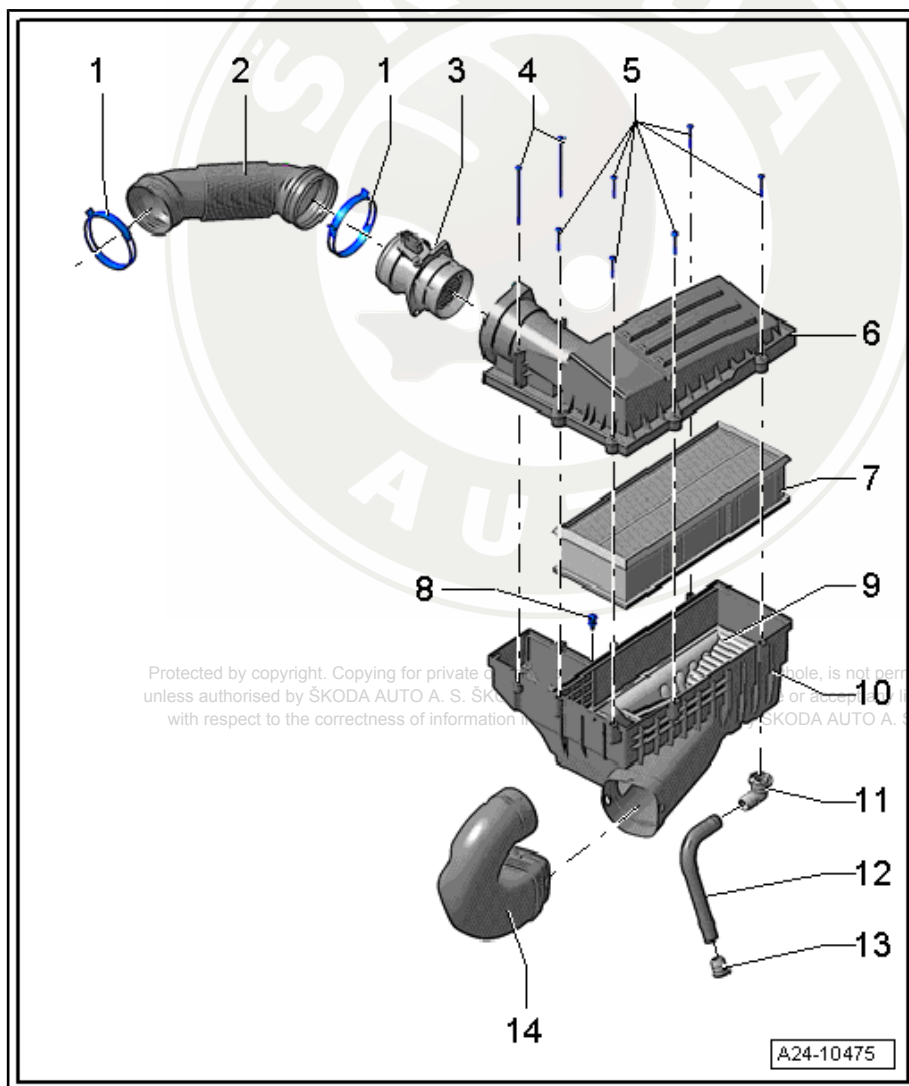
12 - Water drain hose

- ☐ clean the water drain hose

13 - Overflow valve

14 - Connecting hose

- ☐ to the lock carrier
- ☐ clean the connecting hose from dirt and leaves





3.2 Removing and installing air filter housing

Special tools and workshop equipment required

- ◆ Pliers for spring strap clamps

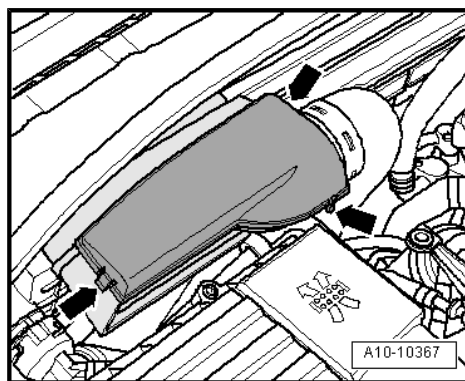
Removing



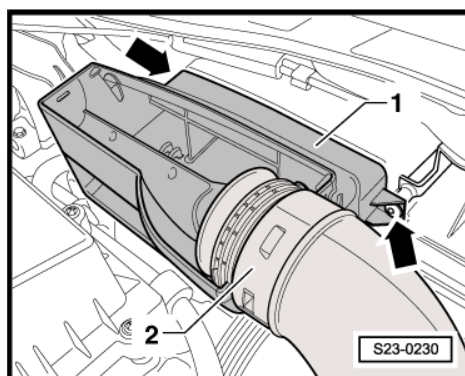
Note

For the following work it is advantageous to disconnect the intake hose from the intake manifold.

- Remove engine cover.
- Remove cover for air intake pipe, to do so release lateral retaining clasps -arrows-.



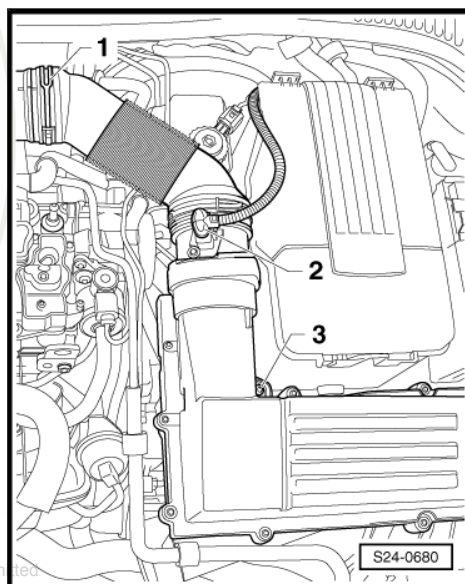
- Release screws -arrows- for the air intake connection -1- and take connecting hose -2- out of the guide.
- Remove air intake pipe -1-.



- Disconnect plug -2- from air mass meter -G70- and intake air temperature sender 2 -G299- .
- Open the spring strap clip -1- and pull off.
- Screw out screw -3-.
- Slacken two drifts of the air filter housing and remove it to the top from under the upper coolant hose.

Install

- Installation is carried out in the reverse order.



4 High pressure pump

4.1 High pressure pump - Summary of components



WARNING

The fuel system is under pressure! Before opening the high pressure of the injection system, the fuel pressure with a remaining pressure must be reduced ⇒ [page 4](#).

1 - Roller tappet

- ☐ can remain stuck in the vacuum pump after removing the high pressure pump, removable

2 - O-ring

- ☐ replace

3 - High pressure pump

- ☐ with fuel pressure regulating valve -N276 -
- ☐ Fuel high pressure line to high pressure pump: 17 Nm
- ☐ Install fuel high pressure line not under tension
- ☐ removing and installing ⇒ [page 220](#)

4 - Fuel pressure regulating valve -N276-

5 - Hole in the vacuum pump for the high pressure pump

6 - Injection valves

- ☐ Replace O-ring and combustion chamber gasket ring (Teflon gasket ring)
- ☐ pay attention to correct installation position
- ☐ removing and installing ⇒ [page 222](#)

7 - Hall sender -G40-

8 - Camshaft adjustment valve 1 -N205-

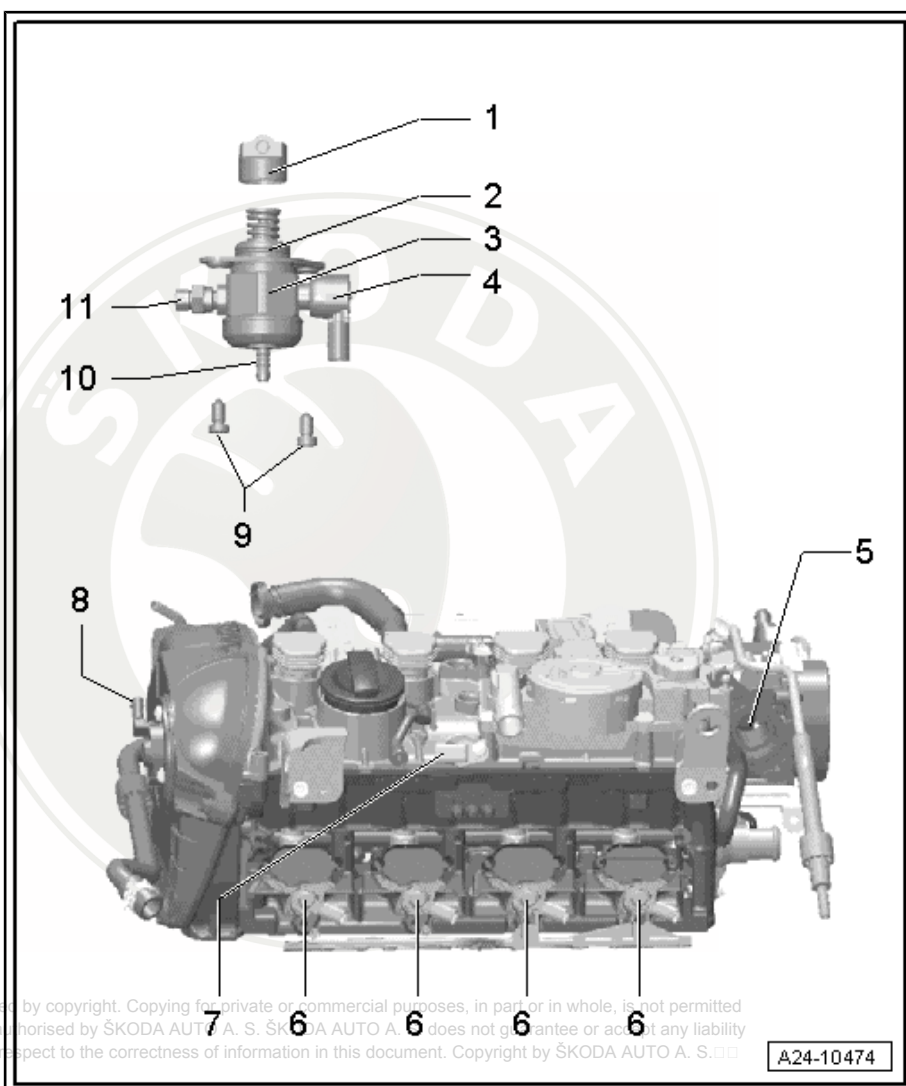
9 - 10 Nm

- ☐ replace

10 - Connection fitting for fuel feed line

11 - Connection fitting for fuel high pressure line

- ☐ replace
- ☐ 22 Nm
- ☐ Fuel high pressure line to high pressure pump: 18 Nm





- ❑ Install fuel high pressure line not under tension

4.2 Removing and installing the high pressure pump

Removing



WARNING

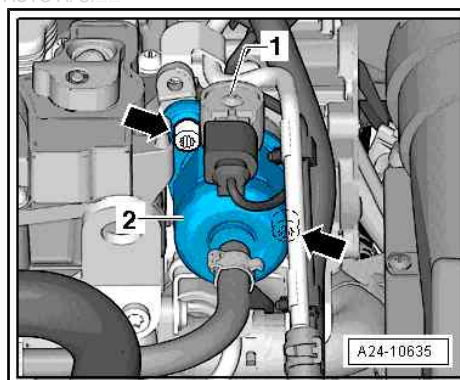
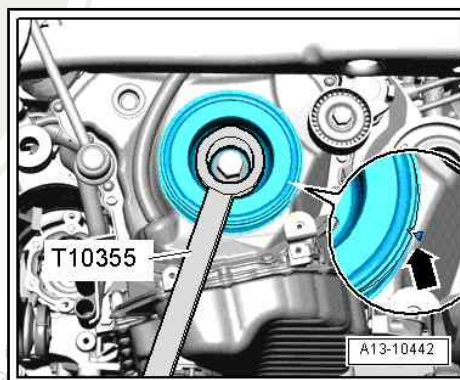
*The fuel system is under pressure! Before opening the high pressure of the injection system, the fuel pressure with a remaining pressure must be reduced ➔ **page 4**.*



Note

- ◆ Remove and install high pressure pump only on a cold engine.
- ◆ When installing the high pressure pump, make sure that no dirt can get into the fuel system.
- ◆ Collect escaping fuel with a cloth.
- ◆ The O-ring and the connection fitting must always be replaced.
- ◆ Always screw on fuel high pressure lines free of stress.

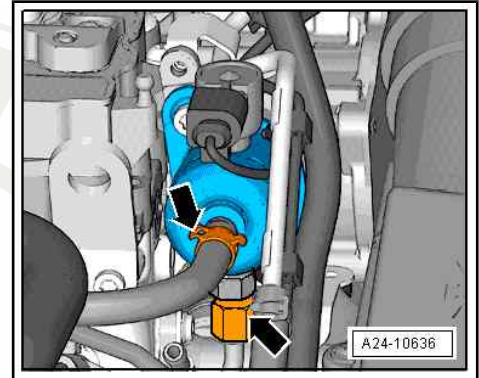
- Remove engine cover.
- Position crankshaft on TDC for cylinder 1.



- Disconnect the plug from the fuel pressure regulating valve - N276- -1-.



- Open both fuel lines -arrows-.



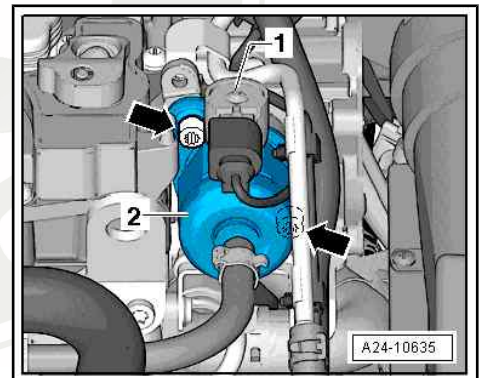
- Release both screws -arrows-.
- Carefully remove the high pressure pump. The roller tappet can remain stuck in the vacuum pump.

Install



Note

When installing the high pressure pump, the roller tappet must be on its lowest point.



- Replace O-ring for high pressure pump.
- Inspect roller tappet for damage, if necessary replace.
- Insert roller tappet into the vacuum pump.
- Insert high pressure pump into the vacuum pump and tighten.
- Replace connection fitting for fuel high pressure line and tighten.
- Tighten fuel high pressure line free of tension.

♦ Tightening torques: ⇒ [page 219](#)

Further installation occurs in reverse order.



Note

Check fuel system for tightness.

5 Injection valves

5.1 Removing and installing injection valves

Special tools and workshop equipment required

- ◆ Set of tools -T10133-
- ◆ Extractor -T10133/16-



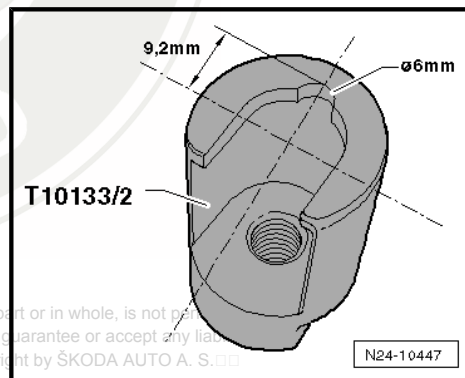
Note

The tool Puller -T10133/2 - was modified and has now the designation Puller -T10133/2A - . If you do not have the new tool yet, you can carry out the change yourself.

change puller -T10133/2 - to puller -T10133/2A-

Special tools and workshop equipment required

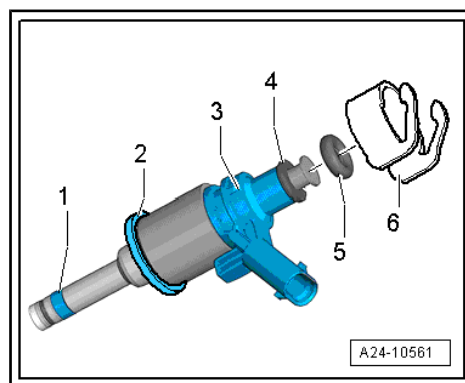
- ◆ Round file approx. 6 mm
- Refine a semi circle as shown in the illustration. The tool can be pushed onto the injector through the semi circle and thus the tool has more contact surface.
- Mark the machined tool with an "A" at the end of the tool number.



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Injection valve - Individual parts

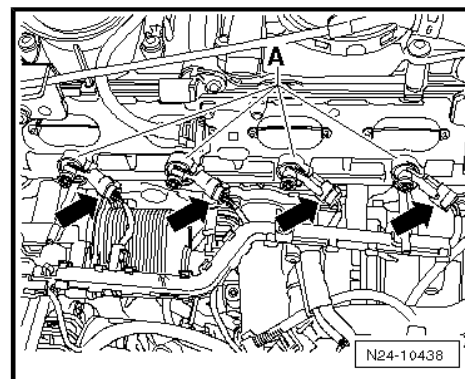
- 1 - Replacing the combustion chamber gasket ring (Teflon gasket ring). When installing, the combustion chamber gasket ring must not be greased or treated with a lubricant.
- 2 - Check intermediate ring, fitting position: The cone points to the valve.
- 3 - Injector
- 4 - Replace slotted supporting ring.
- 5 - O-ring, replace. Before fitting moisten lightly with clean engine oil.
- 6 - Supporting element (the fuel distributor exerts a force via this supporting element, which holds the injector in the cylinder head)



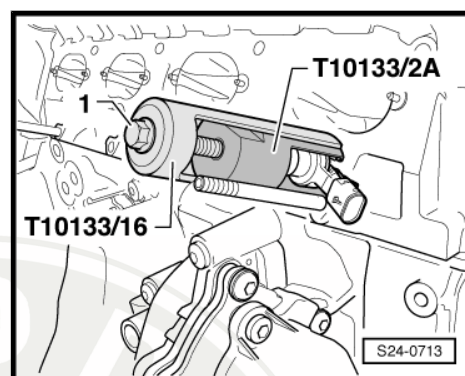
Removing

- Remove intake manifold with fuel distributor ➔ [page 205](#) .
- Seal intake passages with a clean cloth.

- Remove the supporting elements -A- and disconnect the plugs -arrows- from the injection valves.



- Position the puller -T10133/2A- into the groove at the injection valve.
- Then fit on the removal tool -T10133/16 - and unplug the injection valve by turning the screw -1-.



Note

Pay attention to the intermediate ring.

Install



Caution

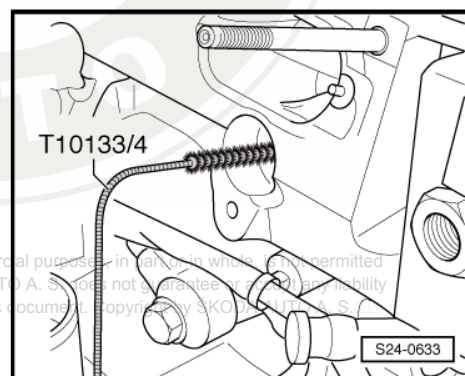
When installing, the combustion chamber gasket ring (Teflon gasket ring) must not be greased or treated with a lubricant.



Note

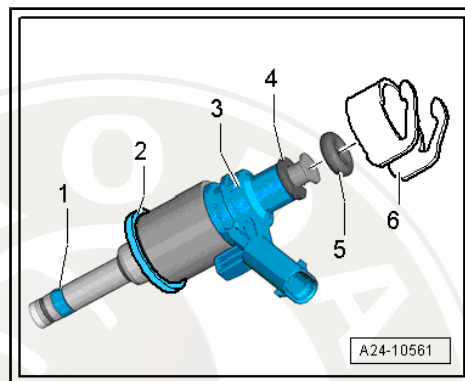
An open inlet valve can possibly prevent a cleaning. In this case it will be necessary to rotate the engine on the crankshaft with a wrench by hand.

- Thoroughly clean the holes of the high pressure injection valves in the cylinder head with the nylon brush -T10133/4- .

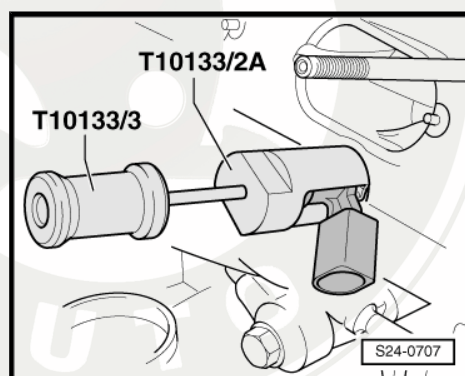


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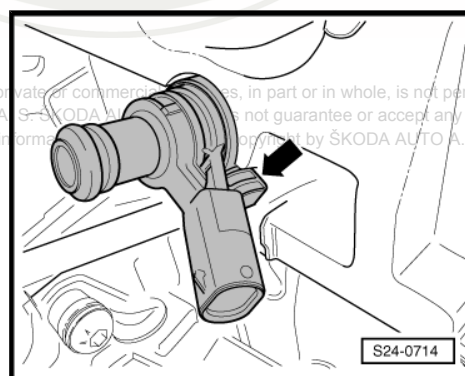
- Replace the combustion chamber gasket ring (Teflon gasket ring) -1- of the injection valves ➔ [page 224](#) .
- Replace the supporting ring -4- and the O-ring -5- (moisten lightly with clean engine oil).
- Mount the intermediate ring -2-.



- Use the striking hammer -T10133/3 - with the puller - T10133/2A- , in order to press the injection valve up to the stop into the hole of the cylinder head.



- Pay attention to the correct position of the injection valves in the cylinder head -arrow-.
- Fit supporting element.
- Install intake manifold with fuel distributor ➔ [page 205](#) .



5.1.1 Replacing the combustion chamber gasket ring (Teflon gasket ring)

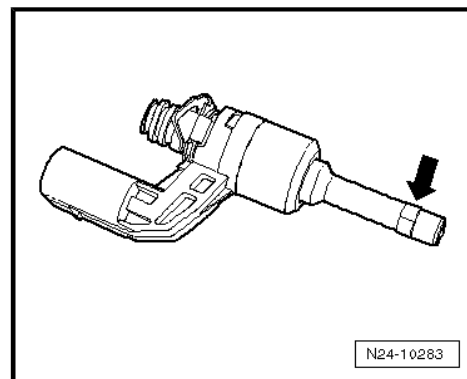


Caution

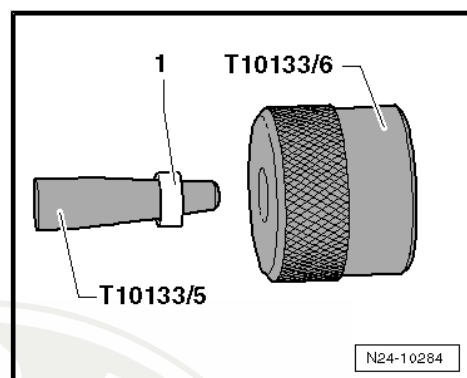
The Teflon gasket ring must not be oiled.

- Carefully clean the injection valve.

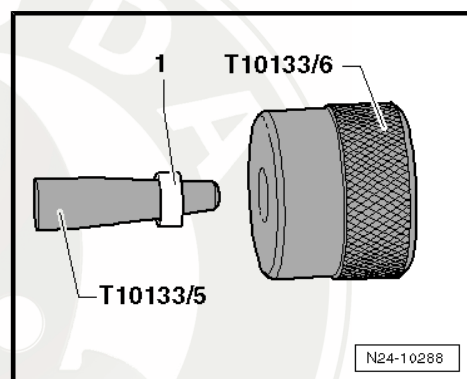
- Carefully cut open the gasket ring with a knife as shown -arrow-. Absolutely try to avoid the contact of the knife blade with the valve body.
- Remove the old gasket ring and clean the gasket ring nut in the area of the gasket ring -arrow-. Remove the existing deposits (carbon deposits) with a wire brush.



- Fit a new gasket ring -1- onto the assembly cone -T10133/5-. Slightly push the gasket ring with the assembly sleeve -T10133/6- (knurling points to the gasket ring -1-) as far as possible onto the assembly cone -T10133/5-.

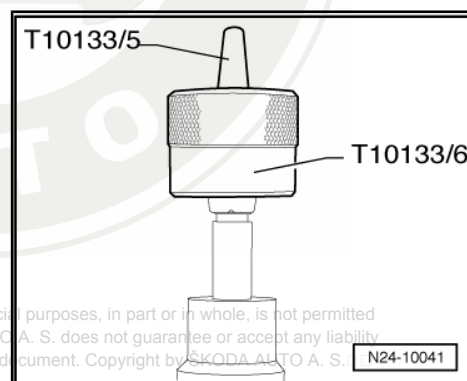


- Turn the assembly sleeve -T10133/6- around (now the knurling points away from the gasket ring), and push the gasket ring -1- up to the end onto the assembly cone -T10133/5-.
- Now position the assembly cone -T10133/5- with the gasket ring from the front onto the injection valve. Push the gasket ring with the assembly sleeve -T10133/6- further onto the injection valve.



The gasket ring is not yet seated in its groove.

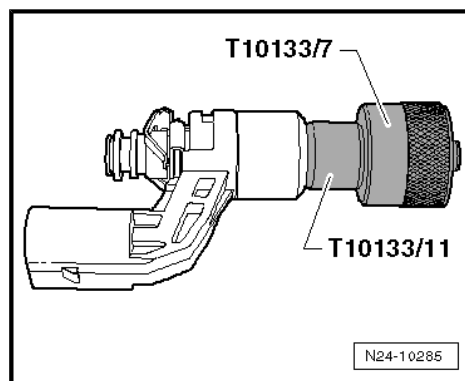
- Remove the assembly sleeve -T10133/6- and the assembly cone -T10133/5-.
- Push the gasket ring by hand into the annular groove.
- Fit the spacer sleeve -T10133/11- onto the valve body.



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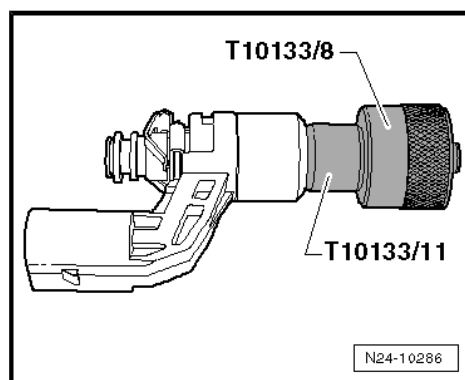


- Now press the calibration sleeve -T10133/7- via the gasket ring up to the stop at the spacer sleeve -T10133/11- .
- Pull off again the calibration sleeve -T10133/7- .



- Now press the calibration sleeve -T10133/8- via the gasket ring up to the stop at the spacer sleeve -T10133/11- .
- Pull off again the calibration sleeve -T10133/8- .

Now the Teflon gasket ring has its correct fitting dimension.



6 Testing components

6.1 Test intake manifold changeover

Special tools and workshop equipment required

- ◆ Hand vacuum pump , e.g. -VAS 6213-



Note

Observe all safety measures and notes for assembly work on the fuel, injection and ignition system as well as the rules for cleanliness ⇒ [page 3](#).

The test should only be carried out if there is a problem with a poor torque. I.e. if insufficient elasticity or poor pulling power exists.

Test condition

- The valve for intake manifold flap -N316- was checked with the ⇒ Vehicle diagnosis, testing and information system VAS 5051.

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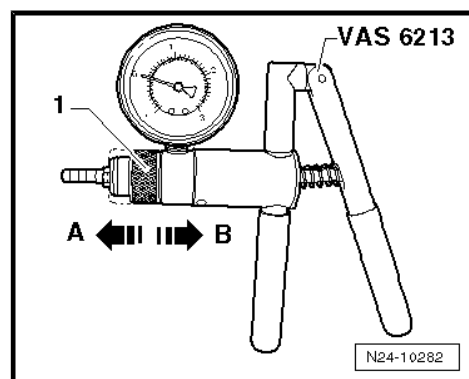
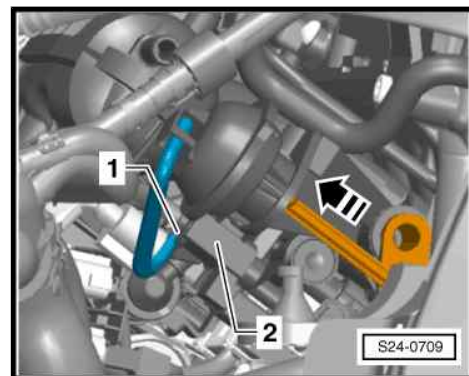
Test sequence

If the valve for intake manifold flap -N316- is o.k., perform the following tests:

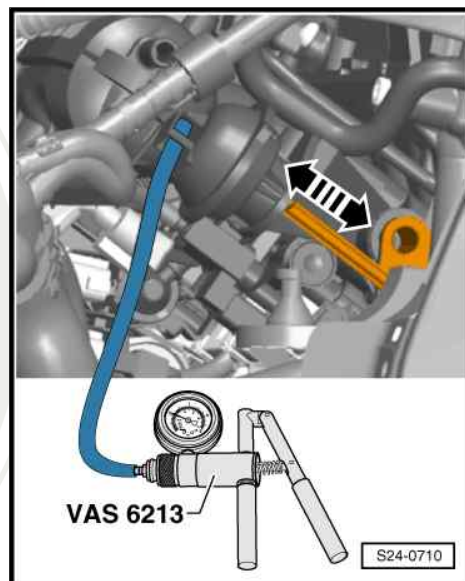
- Remove engine cover.
- Start engine and run in idle.
- The engine speed can suddenly be increased by a 2nd person (high acceleration). Observe vacuum setting element for intake manifold changeover.
- The setting element must be tightened -arrow-.

If the switch-over does not function as indicated:

- Inspect the vacuum system for tightness.
- Check smooth operation of changeover mechanism. To this end activate the linkage by hand.
- Inspect vacuum lines to see that they are connected properly.
- Check vacuum hoses for porosity.
- Detach the vacuum hose -1- to the variable intake manifold changeover positioning element at the intake manifold flap valve -N316- -2-.
- Put sliding ring -1- of hand vacuum pump -VAS 6213- in position -A- for "vacuum".
- Connect the hand vacuum pump -VAS 6213- to the intake manifold flap valve positioning element.



- Operate the hand vacuum pump -VAS 6213 - several times.
The vacuum setting element must move -arrows-.
- If the vacuum setting element does not move, replace the vacuum setting element.



6.2 Check double non-return valve

Special tools and workshop equipment required

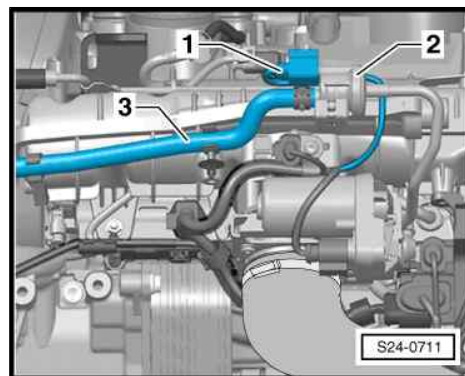
- ♦ Hand vacuum pump, e.g. -VAS 6213-
- ♦ Measuring tool set, e.g. -V.A.G 1594 C-

Test condition

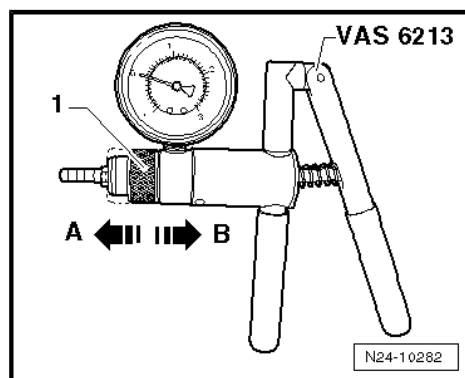
- The activated charcoal filter system solenoid valve 1 -N80- was checked with the ⇒ Vehicle diagnosis, testing and information system VAS 5051 and is O.K.

Test sequence

- Remove engine cover.
- Remove the plug -1- and the ventilation hose -3- from activated charcoal filter system solenoid valve 1 -N80- -2-.



- Put sliding ring -1- of hand vacuum pump -VAS 6213- in position -A- for "vacuum".

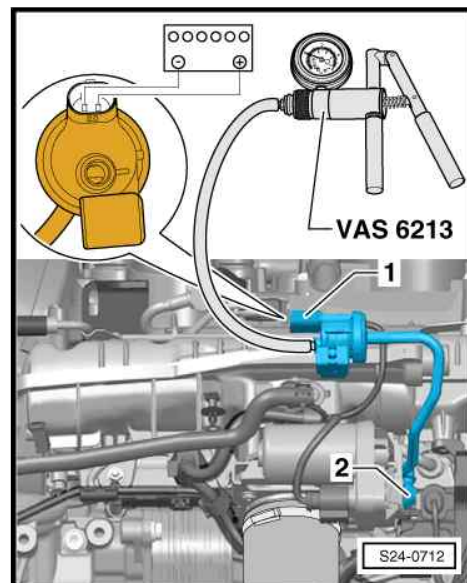


- Connect hand vacuum pump -VAS 6213 - on activated charcoal filter system solenoid valve 1 -N80- .
- Use adapter cables to connect the contacts of the activated charcoal filter system solenoid valve 1 -N80- -1- with the battery. Thus the activated charcoal filter system solenoid valve 1 -N80- is opened.
- Operate the hand vacuum pump -VAS 6213- several times.
 - A vacuum should build up.
- Disconnect battery again.

If no vacuum builds up:

- Replace double non-return valve -2-.

The double non-return valve, the activated charcoal filter system solenoid valve 1 -N80- and the fuel hoses are one component and can only be replaced completely.





7 Engine control unit

7.1 Removing and installing engine control unit

Special tools and workshop equipment required

- ◆ Body saw, e.g. -V.A.G 1523 A-



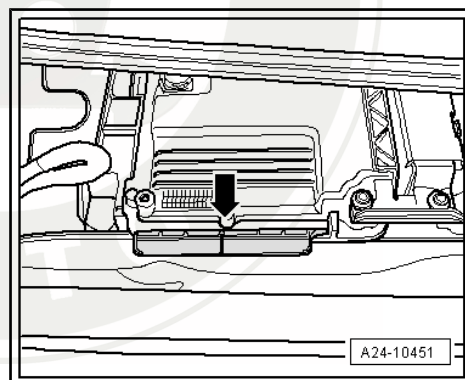
Note

- ◆ *In order to be able to unplug the plugs from the control unit, the control unit must always be removed.*
- ◆ *If the engine control unit is replaced, the vehicle diagnosis, measurement and information system - VAS 5051- must be connected and the function "replace engine control unit" must be carried out.*

Removing

- Switch off ignition.
- Remove the cooling water tank cover ⇒ Body Work; Rep. Gr. 66 .
- Open retaining clip -arrow- and remove engine control unit - J623 - .

Vehicles with protective cover for plug connections

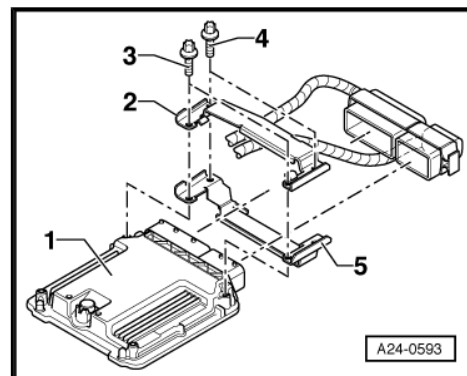


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- Cut with body saw a slot for the cross-head screwdriver in the heads of the pull-off screws -3 and 4-.

**Note**

- ◆ *It must be sawed twice with the body saw, so that the slot is wide enough, in order to be able to unscrew the screws with a suitable screwdriver.*
- ◆ *A locking agent is applied to the pull-off screws.*
- Unscrew the screws and remove the protective cover for plug connections -2 and 5-.

**Continued for all vehicles**

- Unlock both plugs at engine control unit and unplug.

Install

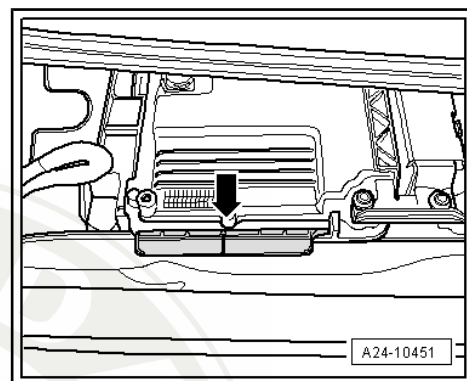
- Insert both plug connections and secure.

Vehicles with protective cover for plug connections

- Fasten protective cover with new pull-off screws.
- Tighten pull-off screws evenly until the screw heads are pulled off.

Continued for all vehicles

- Push engine control unit into the bracket and lock with retaining clip -arrow-.
- Install water box cover ⇒ Body Work; Rep. Gr. 66 .



26 – Exhaust System

1 Removing and installing parts of the exhaust system

1.1 Exhaust system - Summary of components for engine identification characters BZB

1 - Gasket

- ☐ replace

2 - 40 Nm

- ☐ replace
- ☐ Coat pin screws of exhaust manifold with hot bolt paste -G 052 112 A3-

3 - Lambda probe -G39- , 55 Nm

- ☐ the thread of new lambda probes must be coated with assembly paste
- ☐ if a re-used lambda probe is installed, only coat the thread with hot bolt paste -G 052 112 A3- ; the hot bolt paste - G 052 112 A3- must not get into the slots of the probe body

4 - Pre-exhaust pipe

- ☐ with catalytic converter
- ☐ protect against shocks and blows
- ☐ with decoupling element
- ☐ do not twist decoupling element more than 10° - risk of damage
- ☐ removing and installing
⇒ [page 237](#)
- ☐ Align exhaust system free of stress
⇒ [page 239](#)

5 - Front clamping sleeve

- ☐ align exhaust system free of stress before tightening ⇒ [page 239](#)
- ☐ Fitting position ⇒ [page 239](#)
- ☐ Tighten bolted connections evenly

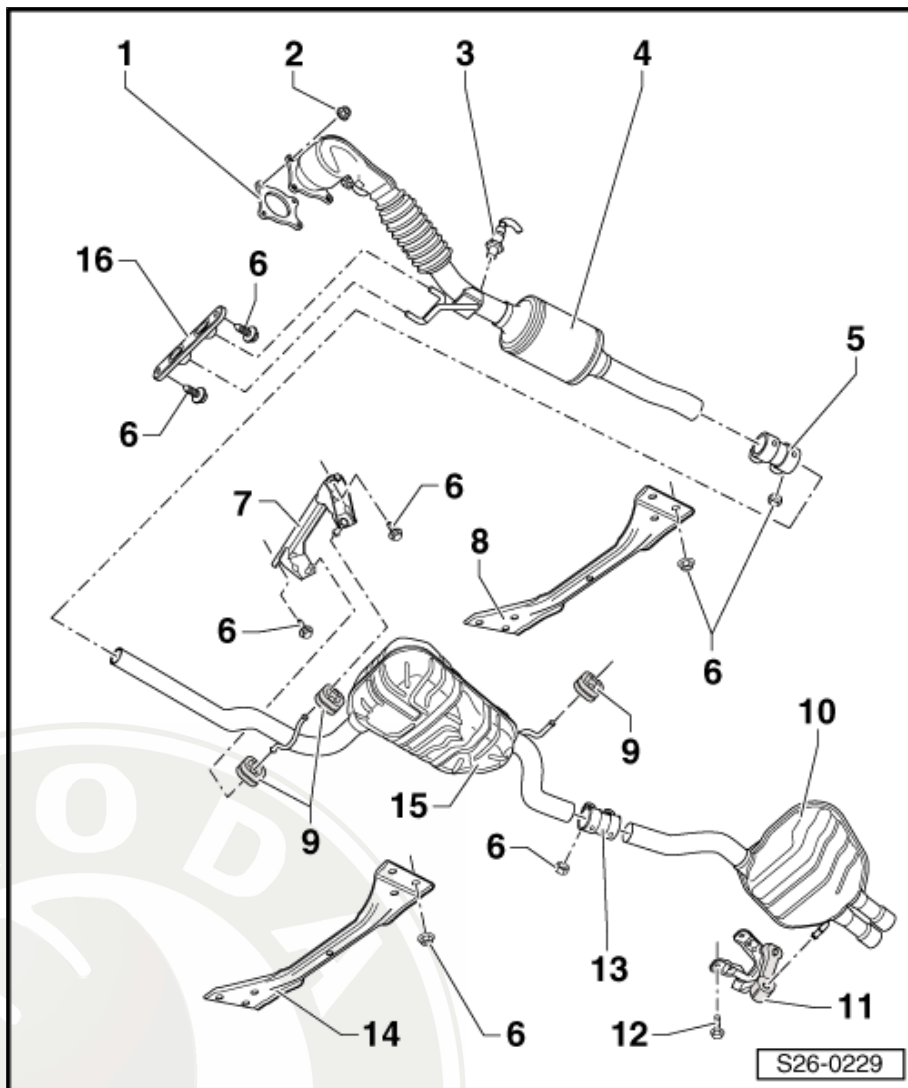
6 - 23 Nm

7 - Hanger

8 - Front cross strut

9 - Retaining strap

- ☐ replace if damaged





10 - Rear part of exhaust system

- ☐ for first equipment building unit with the middle part of the exhaust gas system, replace individually when carrying out repairs
- ☐ replace ⇒ [page 238](#)
- ☐ Align exhaust system free of stress ⇒ [page 239](#)

11 - Hanger

- ☐ replace if damaged

12 - 23 Nm

13 - Rear clamping sleeve

- ☐ for individually replacing the middle and rear part of the exhaust system
- ☐ Fitting position ⇒ [page 238](#)
- ☐ Tighten bolted connections evenly

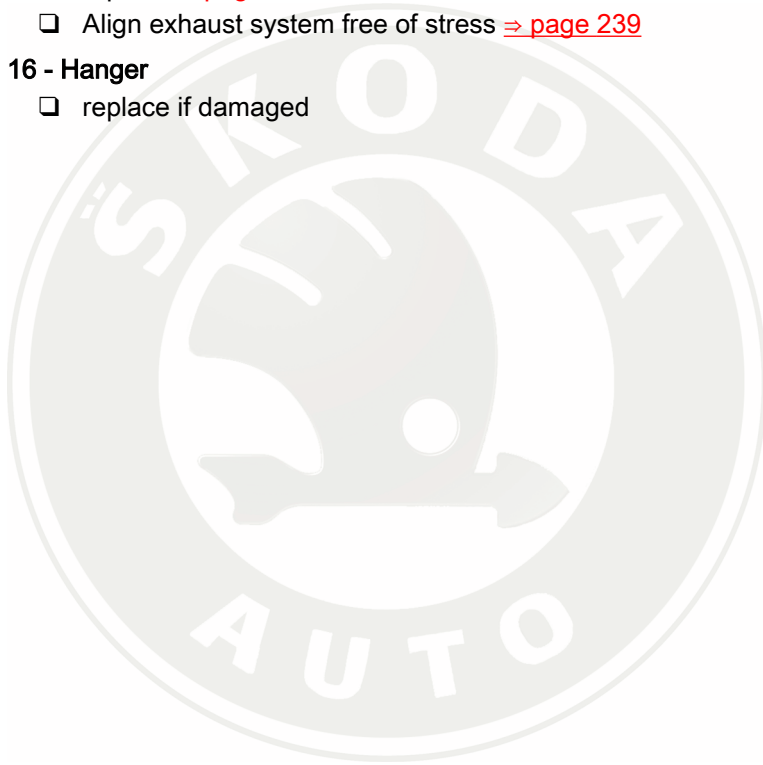
14 - Rear cross strut

15 - Middle part of exhaust system

- ☐ for first equipment building unit with the rear part of the exhaust gas system, replace individually when carrying out repairs
- ☐ replace ⇒ [page 238](#)
- ☐ Align exhaust system free of stress ⇒ [page 239](#)

16 - Hanger

- ☐ replace if damaged



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1.2 Exhaust system - Summary of components for vehicles with engine identification characters CDAA, CDAB, CCZA and front-wheel drive

1 - Gasket

- ☐ replace

2 - 40 Nm

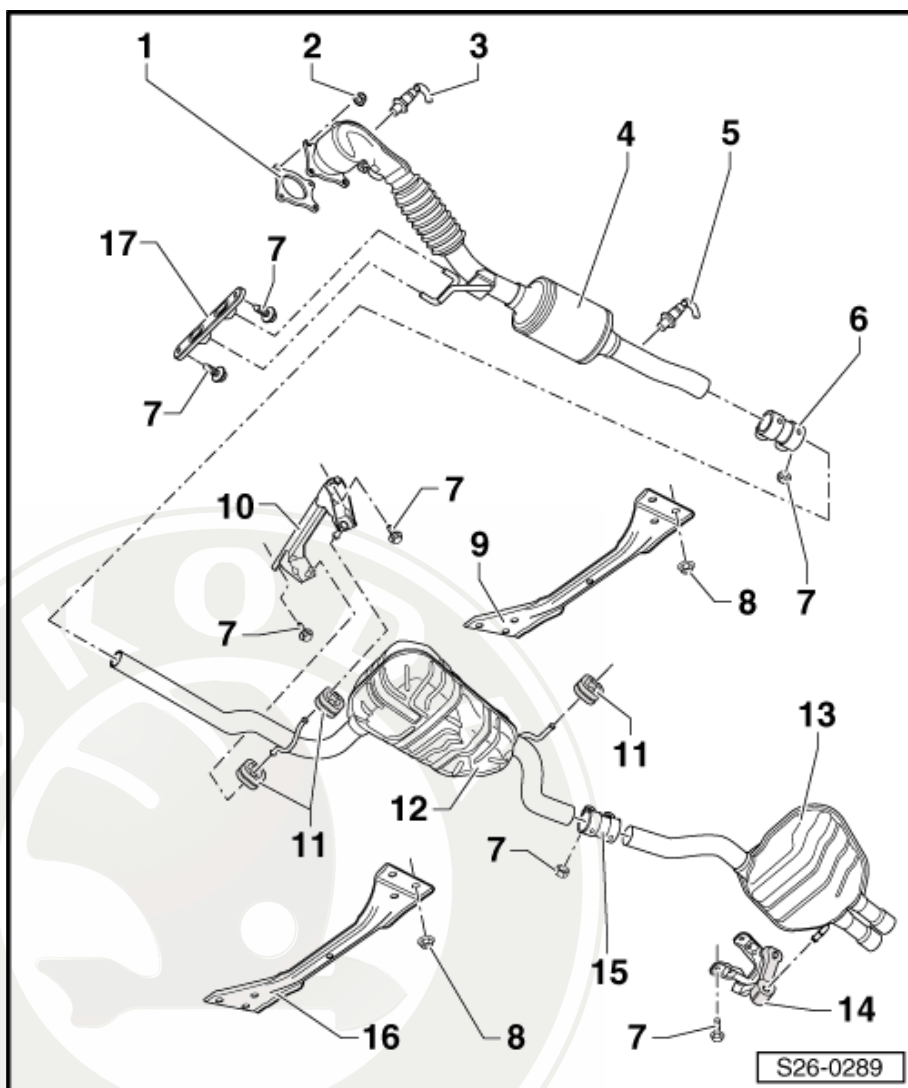
- ☐ replace
- ☐ Coat pin screws of exhaust manifold with hot bolt paste -G 052 112 A3-

3 - Lambda probe upstream of catalytic converter -G39- , 55 Nm

- ☐ the thread of new lambda probes must be coated with assembly paste
- ☐ if a re-used lambda probe is installed, only coat the thread with hot bolt paste -G 052 112 A3- ; the hot bolt paste -G 052 112 A3- must not get into the slots of the probe body

4 - Pre-exhaust pipe

- ☐ with catalytic converter
- ☐ protect against shocks and blows
- ☐ with decoupling element
- ☐ do not twist decoupling element more than 10° - risk of damage
- ☐ removing and installing
⇒ [page 237](#)
- ☐ Align exhaust system free of stress
⇒ [page 239](#)



5 - Lambda probe downstream of catalytic converter -G130- , 55 Nm

- ☐ the thread of new lambda probes must be coated with assembly paste
- ☐ if a re-used lambda probe is installed, only coat the thread with hot bolt paste -G 052 112 A3- ; the hot bolt paste -G 052 112 A3- must not get into the slots of the probe body

6 - Front clamping sleeve

- ☐ align exhaust system free of stress before tightening ⇒ [page 239](#)
- ☐ Fitting position ⇒ [page 239](#)
- ☐ Tighten bolted connections evenly

7 - 23 Nm

8 - 20 Nm

9 - Front tunnel bridge

10 - Hanger

11 - Retaining strap

- ☐ replace if damaged



12 - Middle part of exhaust system

- ☐ for first equipment building unit with the rear part of the exhaust gas system; replace individually when carrying out repairs
- ☐ Align exhaust system free of stress ⇒ [page 239](#)
- ☐ Separate the exhaust system ⇒ [page 238](#)

13 - Rear part of exhaust system

- ☐ for first equipment building unit with the middle part of the exhaust gas system; replace individually when carrying out repairs
- ☐ Align exhaust system free of stress ⇒ [page 239](#)
- ☐ Separate the exhaust system ⇒ [page 238](#)

14 - Retaining strap

- ☐ replace if damaged

15 - Rear clamping sleeve

- ☐ for individually replacing the front or rear silencer
- ☐ Fitting position ⇒ [page 238](#)
- ☐ Tighten bolted connections evenly

16 - Rear tunnel bridge

17 - Retaining strap

- ☐ replace if damaged

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1.3 Exhaust system - Summary of components for vehicles with engine identification characters CDAA, CDAB and four-wheel-drive

1 - Gasket

- ☐ replace

2 - 40 Nm

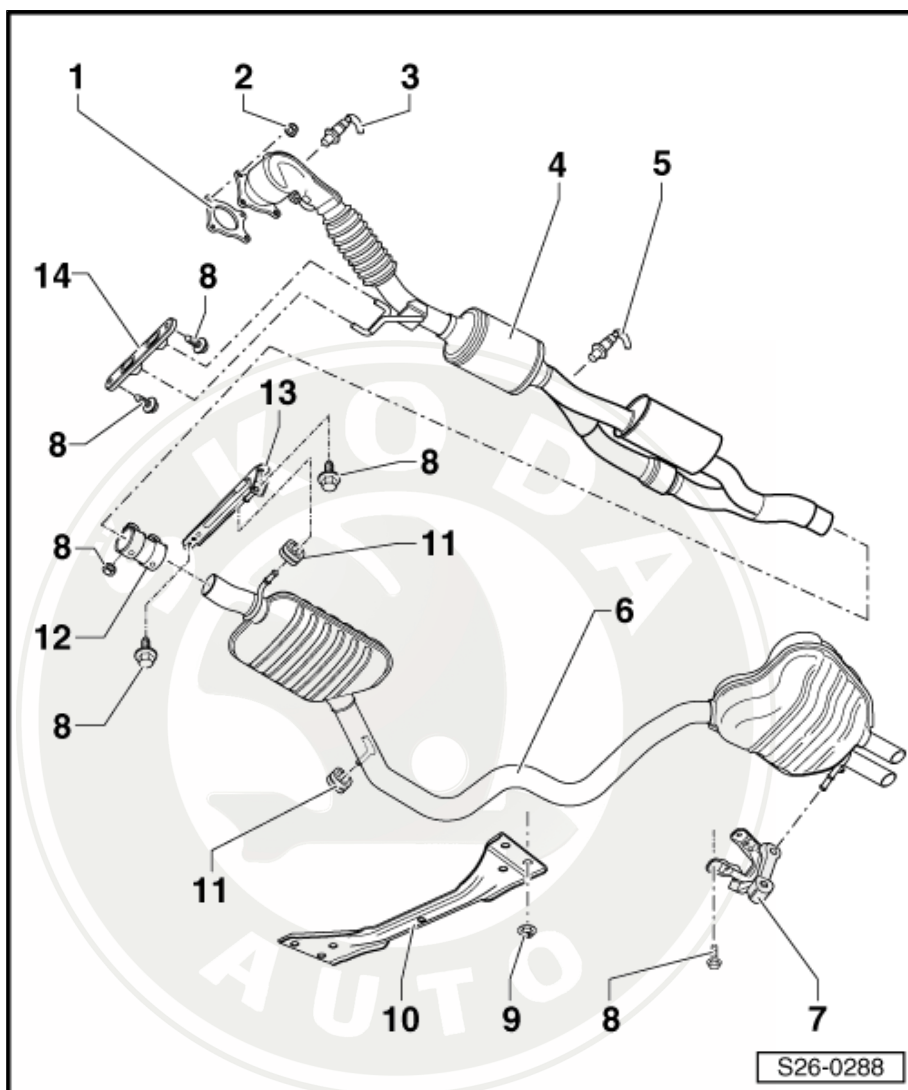
- ☐ replace
- ☐ Coat pin screws of exhaust manifold with hot bolt paste -G 052 112 A3-

3 - Lambda probe upstream of catalytic converter -G39- , 55 Nm

- ☐ the thread of new lambda probes must be coated with assembly paste
- ☐ if a re-used lambda probe is installed, only coat the thread with hot bolt paste -G 052 112 A3- ; the hot bolt paste -G 052 112 A3- must not get into the slots of the probe body

4 - Pre-exhaust pipe

- ☐ with catalytic converter
- ☐ protect against shocks and blows
- ☐ with decoupling element
- ☐ do not twist decoupling element more than 10° - risk of damage
- ☐ removing and installing ⇒ [page 237](#)
- ☐ Align exhaust system free of stress ⇒ [page 239](#)



5 - Lambda probe downstream of catalytic converter -G130- , 55 Nm

- ☐ the thread of new lambda probes must be coated with assembly paste
- ☐ if a re-used lambda probe is installed, only coat the thread with hot bolt paste -G 052 112 A3- ; the hot bolt paste -G 052 112 A3- must not get into the slots of the probe body

6 - Middle and rear silencer

- ☐ replace complete when carrying out repairs
- ☐ Align exhaust system free of stress ⇒ [page 239](#)

7 - Hanger

- ☐ replace if damaged

8 - 23 Nm

9 - 20 Nm

10 - Tunnel bridge

11 - Retaining strap

- ☐ replace if damaged



12 - Front clamping sleeve

- ☐ align exhaust system free of stress before tightening ⇒ [page 239](#)
- ☐ Fitting position ⇒ [page 239](#)
- ☐ Tighten bolted connections evenly

13 - Hanger

14 - Hanger

- ☐ replace if damaged

1.4 Removing and installing exhaust pipe

Special tools and workshop equipment required

- ◆ Ring spanner set for lambda probe
- ◆ Hot screw paste -G 052 112 A3-

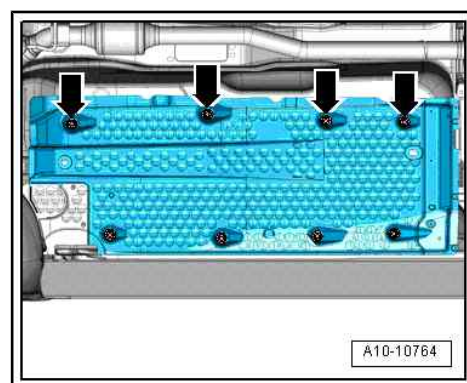
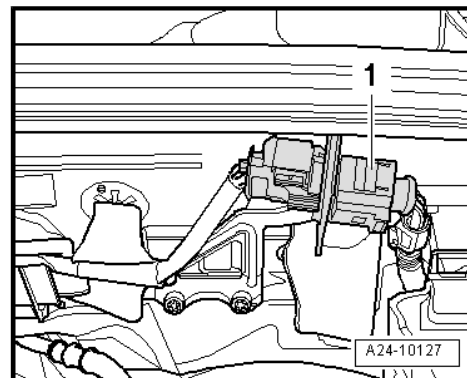
Removing

- Remove the air filter housing ⇒ [page 218](#) .

For engine with identification characters CDAA, CDAB, CCZA

- Remove the plug connection -1- for lambda probe upstream of catalytic converter -G39- from the bracket on the partition wall and disconnect.

Continued for all engines



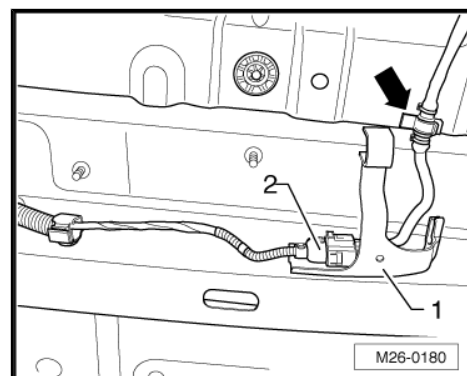
- Unscrew the nuts -arrows- and unfold the floor cover on the right inner side downwards.

- Unclip cable -arrow-, detach bracket -1- and disconnect plug connection -2- for lambda probe -G39/G130- .

Vehicles with four-wheel drive

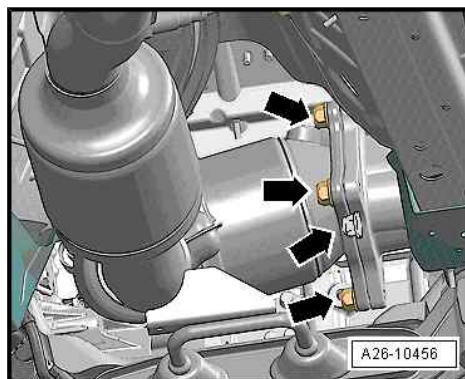
- Remove propshaft ⇒ Gearbox; Rep. Gr. 39 .

Continued for all vehicles

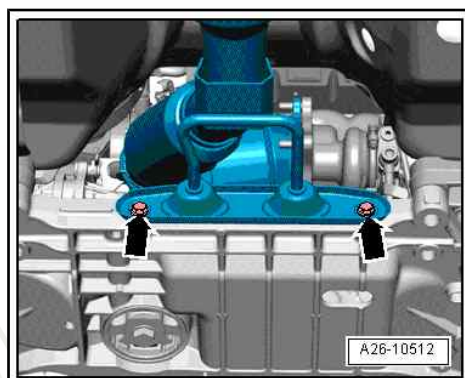




- Unscrew both upper fixing nuts -arrows- of the exhaust pipe/exhaust turbocharger.
- Unscrew both lower fixing nuts -arrows- of the exhaust pipe/exhaust turbocharger.



- Unbolt bracket for exhaust system -arrows-.



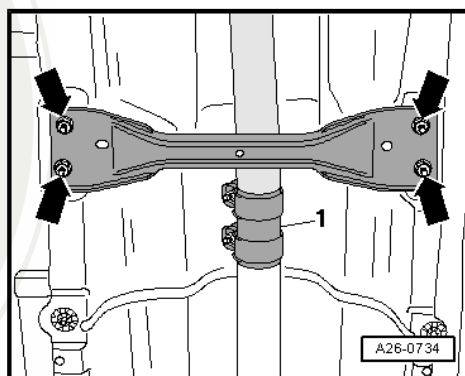
- Remove front tunnel bridge -arrows-.



Caution

Danger of damaging the decoupling element.

- ◆ *Do not twist decoupling element more than 10°.*



- Slacken the clamping sleeve -1- and slide backwards.
- Remove pre-exhaust pipe.

Install

Installation is carried out in the reverse order. Pay attention to the following:

- Replace the gaskets and the self-locking nuts.
- Coat stud bolts of the turbocharger with hot bolt paste -G 052 112 A3-
- Align exhaust system free of stress ⇒ [page 239](#).

1.5 Replacing middle or rear part of the exhaust system

Special tools and workshop equipment required

- ◆ Body saw e.g. -V.A.G 1523 A -
- ◆ Protective goggles



Note

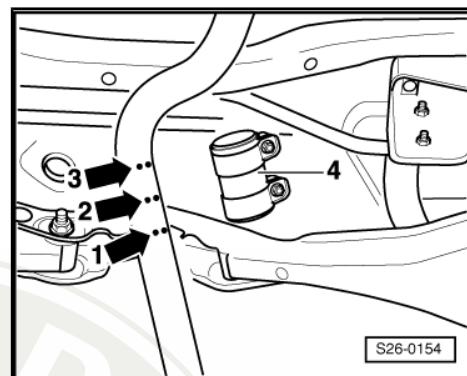
- ◆ For individually replacing the middle or rear part of the exhaust system, a separation point is provided in the connecting pipe.
- ◆ The separation point is marked by indentations on the circumference of the exhaust pipe.



WARNING

In order to avoid injuries because of metal swarfs, wear safety goggles and safety clothing.

- Separate exhaust pipe at right angles at the separation point -arrow 2- with body saw.
- When installing, position rear clamping sleeve -4- at the side markings -arrow 1- and -arrow 3-.
- Turn the rear clamping sleeve -4- in such a way that the ends of the screws are as far upwards as possible.
- Align rear part of exhaust system horizontally and tighten rear clamping sleeve -4- to 23 Nm.
- Align exhaust system in cold condition free of stress
⇒ [page 239](#).



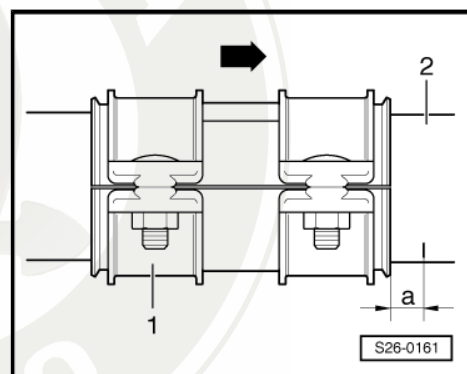
1.6 Aligning exhaust system free of stress

- The exhaust gas system must be cold for aligning.
- Slacken nuts on the front clamping sleeve -1- and align front exhaust pipe -2- (-arrow- points in direction of travel).
- -a- = 5 mm

The fixing screws must be on the right. The screws must not protrude beyond the bottom edge of the clamping sleeve.

- Tighten the front nut by hand.

Vehicles with front-wheel-drive



- Push the exhaust system so far forward until the initial load -dimension a- on the retaining strap at the middle silencer is 9...11 mm.

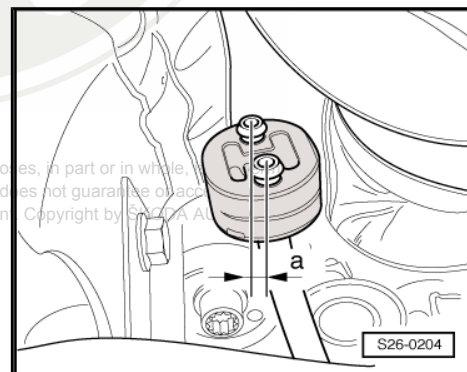
Vehicles with four-wheel drive

- Push the exhaust system so far forward until the initial load -dimension a- on the retaining strap at the middle silencer is 7...9 mm.

Continued for all vehicles

- Tighten the nuts of the front clamping sleeve evenly to 23 Nm.

Align exhaust tailpipes

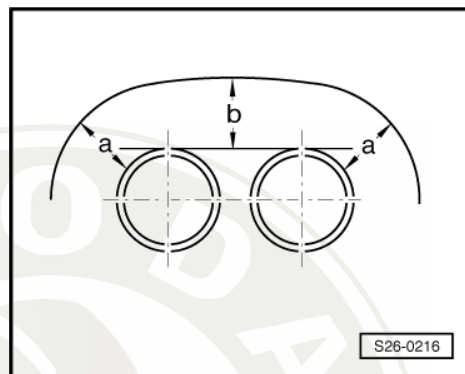




- Align rear silencer in such a way that there is an equal distance -a- between bumper opening and exhaust tailpipe.

At the same time there must be an equal distance -b- from the bumper opening to the exhaust tailpipes.

For aligning, if necessary the hangers of the exhaust system must be loosened.



1.7 Inspecting the exhaust system for leak-tightness

- Start engine and run in idle.
- Seal off exhaust tailpipes for the duration of the leak check (e.g. with cloth or plug).
- Inspect connection points of cylinder head/exhaust manifold, exhaust gas turbocharger/pre-exhaust pipe etc. for leaktightness by listening and visual inspection.
- Eliminate any leak found.

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28 – Ignition system

1 Ignition system

1.1 Summary of components

1 - Knock sensor 1 -G61-

- ☐ at front cylinder block below the intake manifold
- ☐ contacts gold-plated

2 - 20 Nm

- ☐ The tightening torque influences the knock sensor function

3 - Ignition coil with power output stage -(N70, N127, N291, N292)-

- ☐ removing and installing
⇒ [page 241](#)

4 - Spark plug, 30 Nm

- ☐ Type and electrode spacing ⇒ Maintenance ; Octavia II
- ☐ use spark plug wrench e.g. - 3122 B- for removing and installing

5 - O-ring

- ☐ replace

6 - Engine speed sender -G28-

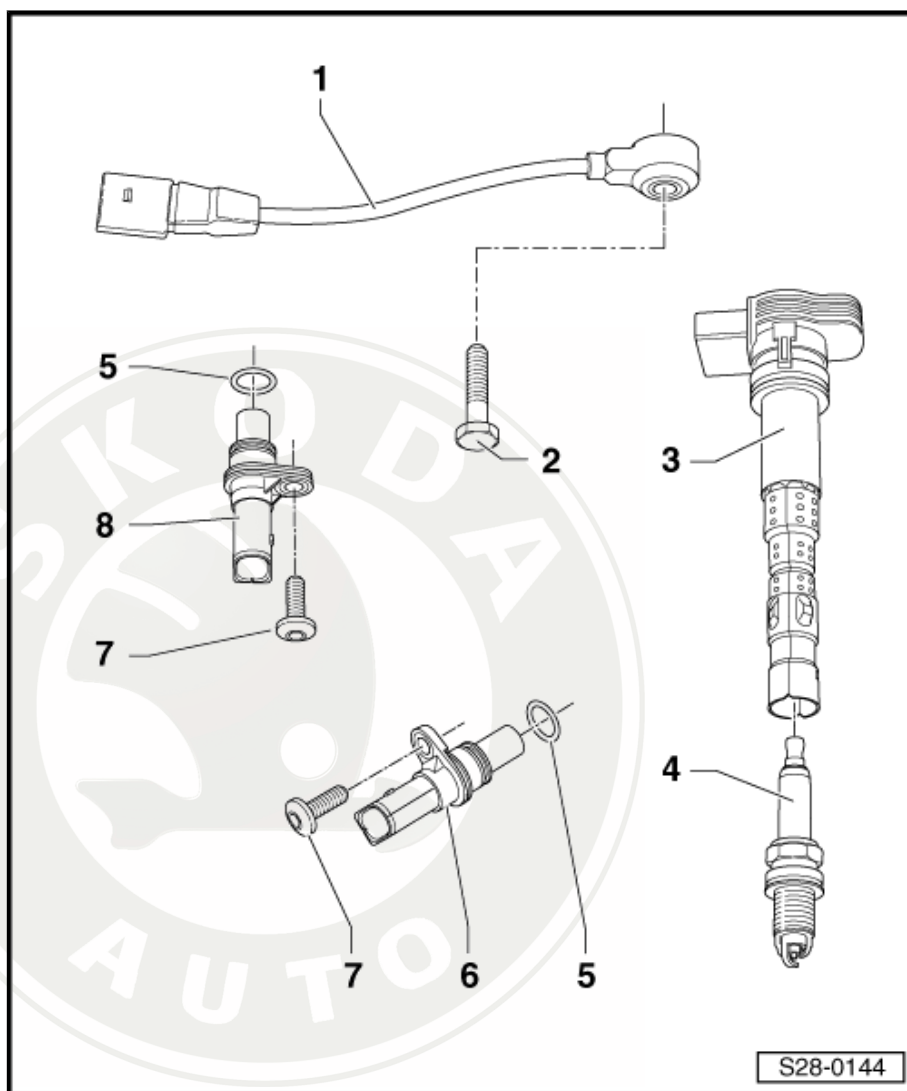
- ☐ in front cylinder block on the bottom left

7 - 8 Nm + torque a further 90° (1/4 turn)

- ☐ replace

8 - Hall sender -G40-

- ☐ in the front cylinder head cover ⇒ [page 69](#)
- ☐ contacts gold-plated



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1.2 Removing and installing ignition coils with power output stages

Special tools and workshop equipment required

- ◆ Extractor -T40039-

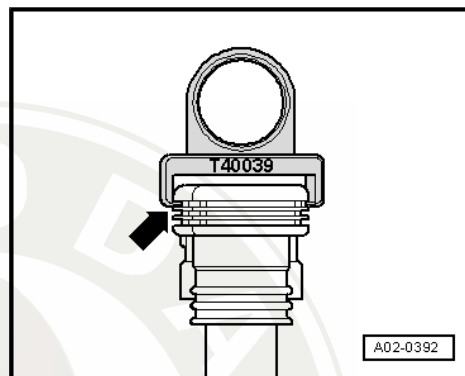
Removing

- Remove engine cover.



Note

- ◆ *For detaching the ignition plugs position the puller -T40039- on the upper thickest rib -arrow- of the ignition coil with power output stage.*
- ◆ *If the lower ribs are used, they can be damaged.*
- Release the connectors at all ignition coils and then pull off all connectors at the same time.
- Pull all ignition coils out of the spark plug shaft with the extractor -T40039- .



Install

- Insert all ignition coils loosely into the spark plug shaft.
- Align the ignition coils to the plugs.
- Fit all plugs simultaneously onto the ignition coils.
- Press the ignition coils evenly with the hand onto the spark plugs.

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